Language Learning in Virtual Worlds

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Abstract

Language Learning has utilized technology for decades, and while world-wide social dynamics place more demands for language learning, there has not been a widespread use of a specific technology as the dominant medium for language learning. In the meanwhile, Virtual Worlds technology emerged during the last two decades as an immersive technology that offers an online representation of reality, allowing user interaction with the surrounding environment including objects and other users through Internet-enabled desktop personal computers. Since their introduction, Virtual Worlds have grown in popularity, and are now utilized by a large online community as social and gaming environments. Over two decades of research have shown the potential of Virtual Worlds for learning in various fields, but very few empirical studies have been dedicated to explore Virtual Worlds for language learning.

The focus of this PhD research project is to explore the potential of the Virtual World Second Life in enabling effective language learning. The research question is as follows: 'Could Virtual Worlds offer a suitable language learning environment, similar or better than that offered by traditional media of language learning?' Towards answering that question, a pilot and two studies were conducted in 2007, 2008 and 2009 respectively. Arabic language classes were delivered to groups of language learners in the UK using different media of language learning: a face-to-face (f-to-f) classroom, a videoconferencing (VC) classroom, and a Virtual World (VW) classroom.

The language learning quality outcomes along with student attitudes were assessed through a comparative analysis between the three media, involving attitude surveys, interviews, assessments of learning outcomes, and the critical incident method applied to video recordings. Due to several limitations, the effectiveness of the VW medium

in enhancing the quality of the language learning experience was found lacking in the light of data collected and analyzed. A set of conditions and recommendations is therefore described to better utilize VWs for language learning.

Preface

The runway lights glittered in the dark as the plane approached for landing. Suddenly, the unexpected happened, and the large plane made an acute left-side turn and dipped into the airport ground sideways with the nose down with no chance of a correction of course. Earlier that week, the pilot (none-other than the researcher, studying at the time in Oklahoma), was spending the 1990 thanksgiving holiday with the Thomas family after his roommate invited him over to his house.

The family was very welcoming, and made sure the guest was well attended to. The father was an Air Force-1 pilot who flew President Reagan for years. After retiring he trained new pilots at the Air-Force Base in Altus, Oklahoma. When invited to the airbase, I was excited. After-all, I wanted to be an astronaut since childhood, and if I could afford it I would have studied to be a pilot instead of an Engineer. After the professional pilot showed me how to fly a large C5 plane using the large simulation cockpit, he asked me to land the plane in daylight, which turned out to be a perfect landing. But when the simulation was re-programmed for a night landing, the story was different and the crash was imminent.

This was one of a number of experiences in my life that made me grow fond of Virtual Reality, which I read about and researched after getting my MSc degree in Electrical Engineering in 1995. And when I thought of pursing my PhD degree, this area was my primary choice for research. I never thought however that I would be a teacher. Five months after graduation, I started teaching at a University close to my hometown in Lebanon.

While engineering skills and knowledge came in very handy, building experience in education took years of teaching, and when the opportunity came to pursue a PhD in

Technology Enhanced Learning, it was only natural for me to choose Virtual Worlds in Education.

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Chapter 1

Introduction

1.1   Overview

This chapter constitutes an introduction to the research project. It starts with a set of motivational factors that justify the need for alternative learning media, including social dynamics such as violence against educational systems around the world (section 1.2.1), global business trends that necessitate language learning (section 1.2.2), a growing trend of home-schooling (section 1.2.3), along with special needs for education (section 1.2.4), adult learning trends (section 1.2.5), and the penetration of technology in every-day life of a growing population around the world (section 1.2.6).

The promise of Virtual Worlds (VWs) in fulfilling the need for alternative learning media is then described in section 1.3, based on the outcome of extensive research on the potential of VWs in learning, and on the popularity of VWs among Internet users. The question whether the promise is real remains to be seen in light of the research project outcomes.

The chapter proceeds to give an overview of the research project, including the research question, timetable of studies conducted towards answering the research question, the research design and methods, significance of the research question, as well as the assumptions, limitations, and challenges that faced the research project. The chapter concludes with an overview of the thesis, including its structure, a summary of its findings, and a summary of recommendations for further research in the area of language learning in VWs.

1.2   Dynamics Motivating the Research

1.2.1   Education under Attack

Learning media has a great role to play in facilitating education to a growing population around the world. In a global study commissioned by UNESCO published in 2010 under the title 'Education Under Attack', author Brendan O'Malley uncovers the scope and scale of the attack that educational institutions, officials, teachers, and students are exposed to. The scope is worldwide, from Iraq to Afghanistan, and from Thailand to Colombia, and the scale is large to say the least. The author declares that some parts of the world are becoming a deadly place for a student, teacher or education official. He shows a timeline of 10 days in January 2007, during which violence directed against educators in particular has claimed the lives of several people working in Education around the world (O'Malley, 2010).

Other forms of attack on education span Nepal, where military ranks are populated with children, and schools are bombed or used as military bases, to Myanmar, where an estimated 70,000 children were enlisted in the official army in 2002. The reasons for this violence and neglect are many. A war against girls in Afghanistan is rooted in the religious interpretation that girls should not be educated. In Iraq, the gunning of intellectuals demoralizes the community and hinders its development.

The same report quotes Koïchiro Matsuura, Director-General of UNESCO, proclaiming that 'Education is one of the pillars of development, prosperity and peace. It is a human right. We must do our utmost to defend and ensure the security of those who are working in this vital area' (O'Malley, 2010).

What is surprisingly missing in the recommendations section of Matsuura's report is

any mention of educational technology and the potential role it could play in bridging the huge educational gaps that communities suffer from around the world. Alternative means to education besides the face-to-face classroom become a must for countries like Iraq or Afghanistan where school children and teachers, and University students and professors would rather stay home for the fear of being killed if they go to class.

1.2.2 Global Trends

There is a growing worldwide need for children to learn foreign languages, and there is also a shortage of trained language teachers, particularly in rural areas. With rapid globalization and an increasingly information-driven economy, Chinese people need to communicate in English to compete in the global economy, so English is a required subject from elementary school to college for most mainland Chinese students (Zheng, et al 2009).

However, Chinese students living in mainland China do not have many opportunities to use English in authentic settings, and generally have poor attitudes toward English language learning (Zheng, et al 2009). Educational technology could have something to offer for those students, and game-like VWs could be a way for children worldwide to be exposed to, and to practice, foreign language interactions (Zheng et al., 2009). VWs could offer learners interaction with native speakers and language usage in naturalistic contexts, providing a possibility for a less stressful and more enjoyable environment to use the English language (Roed, 2003).

As Chinese children need to learn English, children in Western countries also need to learn Chinese, or Arabic, or Spanish, or English. And the younger they learn the foreign language the better. VWs offer opportunities to learn languages to students of any country, in an ever-increasing trend of globalization.

1.2.3   Home-schooling

Learning media have a role to play in fulfilling another important need. A growing trend documented in the United States is Home-schooling. Public schools in some deprived areas are turning into war zones with metal detectors to stop weapons getting in. Meanwhile, homes are getting more automated and home-schooling is becoming another modern convenience that keeps children where they can be safe and secure (Sanborn et al., 2005). Between 2003 and 2007, numbers of homeschooled children grew by 36% to reach 1.5 million children (US National Centre for Education Statistics, 2009).

Parents had several reasons for home-schooling in a 2010 survey conducted by the National Household Education Survey. 17% of the parents surveyed claimed the quality of instruction in the local traditional schools was a concern. 31% claimed it was the school environment that convinced them to home school. 30% of the parents had concerns related to religious beliefs (US National Centre for Education Statistics, 2010).

Home-schooling grows in popularity as educated parents come to realize that public-school students were just test-takers and numbers for a head-count, making parents hesitant to allow their children into such a schooling system (Sanborn, et al., 2005).

Schools, however, are more than places of instruction. They are also environments to mix with people of differing cultures, knowledge and viewpoints. By entirely taking education online, children are exposed to a limited set of social interactions, often with others from a similar social and cultural background, and this carries a danger of creating a socially impoverished educational experience, and could serve to increase students' social isolation, and more generally to reinforce social stereotypes. Could technology like VWs, with the immersive first-person experience of the virtual learning environment, the endless collaboration and social interaction possibilities,

and the spectrum of approaches and opportunities for learning, bridge the gap and serve homeschooled children with the education they desire and the social interaction they need during the school years, transforming everyday home computers into virtual classrooms, aided by grading and record keeping software?

In a 2011 PhD dissertation by Kerry Bullock it was found that families around Ohio that use home-schooling utilize technology in one form or another and with varying degrees of influence. Families use the Internet for various resources, and utilize DVDs and computer software as their forms of technology. One family, for example, relies on technology to provide the entire curriculum in an online format, while another family only uses DVDs for the student curriculum (Bullock, 2011). The findings indicated that "the administrators and counselors agree that the resources technology seems to provide influences parents to home school" (Bullock 2011, p3).

These results indicate a two-way relationship between technology and home-schooling. Technology enables parents to apply home-schooling, and the more parents that home school the more technology is being utilized for that purpose.

1.2.4   Special Needs for Education

Special needs for education cover a spectrum of cases and scenarios. Students with certain learning disabilities could be facing behavioral, developmental, or psychological challenges that require special attention in education. Such students can learn complex concepts with greater physical and emotional safety and in a more cost-effective way through virtual environments (Powers et al., 1994). Other special needs for education include when students are bed-ridden, or physically handicapped from going to school.

An array of simulation software applications for learning (such as simulations of field trips) exists to help parents and students meet such needs (Smedley, 2005). Could

VWs be the environment where such tools are integrated, offering the student a situated learning experience that covers the classroom material they would have otherwise missed?

Other special needs for education include situations where education is simply not available to children. The American Educational Research Association stated in a 2004 report that there are 3.4 million children aged 5-17 in the United States who do not speak English or do not speak it well. The majority of those children live in "linguistically isolated households" (Snow 2004, p1, cited in Zheng et al., 2009). Such children might not be motivated by their parents or by the government to join school.

If education at home is such a well-established need for the child's security and quality of learning, educational technology should at least be able to offer educational solutions to the unschooled, the underprivileged, and any students with special needs in education, even when no computing devices are available to those with special needs. VWs, with their engaging and immersive nature, could have a role to play in fulfilling such needs, and could even be on the forefront of educational technology in such an offering.

1.2.5   Adult Learning

For various social and economic reasons, the average age of the typical learner is shifting up. While most learners used to be young in age, this is not the case anymore. Nearly three quarters of American undergraduate students could be classified as non-traditional student or adult learners. In 2008, 36% of postsecondary students in the US were age 25 or older, and 47 percent were independent students (Crimaldi, 2009).

Adult learners come with a myriad of specificities and requirements. They require flexibility in learning around their schedules, and control over what they learn. Mobility is hard for adult learners, as typical adults have established careers and could

be raising families. Leaving everything behind and travelling to another country to enroll at a language centre for a few months or a year to learn a new language is a sacrifice in time and money often too hard to make. Virtual Worlds is a technology that could bring the language centre to adult learners, offering them both the flexibility and control they need in taking an active role in their education, without having to make major shifts in their lives.

1.2.6   Penetration of Technology

Technology is increasingly penetrating societies around the world, and more people are using it in a variety of contexts: at home, at work, on the move, and using it for different purposes. On the other hand, the Internet is contributing to the cancellation of geographical boundaries in several respects. The educational experience has now the potential to be 'freed' from the geographical boundaries of the classroom to have a global dimension and reach. Immersion in a Virtual World to take a language lesson offered by a native speaker in a distant country could now be a matter of opening a computer program on a networked laptop.

1.3   The Educational Promise of Virtual Worlds

1.3.1   The Promise of Research

3D Virtual Worlds have emerged as learning environments based on much promise from research studies. The main aspect of a 3D environment is that it capitalizes upon the natural aspects of human cognition and perception, by extending visual information into three spatial dimensions, with the possibility to supplement this visual information with other stimuli and temporal changes (Wann et al., 1996). VWs allow interactivity and smooth shifts in user perspectives to reflect and induce a sense of presence inside the simulated environment.

From a pedagogical point of view, Hedberg and Alexander (1994) identified three distinctive aspects of VW environments that promised to offer a superior learning experience, namely a fidelity or level of realism, a high level of active learner participation, and a sense of immersion. McLellan (1996) stressed the importance of immersion, indicating that the sense of presence or immersion is a critical feature distinguishing virtual reality, the technology used in VWs, from other types of computer applications.

Different researchers emphasize different positive features of VWs, but according to Smart, Cascio & Paffendof (2007), a set of recurrent features that are invoked include:

- o Persistence of the in-world environment

- o A shared space allowing multiple users to participate simultaneously

- o Virtual embodiment in the form of an avatar (a personalisable 3D representation of the self)

- o Interactions that occur between users and objects in a 3D environment

- o An immediacy of action such that interactions occur in real time

- o Similarities to the real world such as topography, movement and physics that provide the illusion of being there.

Section 2.2 of the literature review presents an extended coverage of empirical research on the educational value of VWs.

1.3.2   The Promise of Popularity

Some of these features must have been compelling enough to attract more than 300 million registered users to spend part of their time navigating over 90 commercial, social, and gaming virtual worlds (Hays, 2008, cited by Spence, 2008). While these VWs were utilized for various purposes including online games and socialization, there remains the potential for this large user-base to reap the benefits of learning in VWs.

The VW Second Life reported that around one million VW residents logon to its servers on an average month, and this number has been increasing since the first quarter (Q1) of 2010 till the third quarter of 2011 (Refer to Figure 1.1). It was shown on the same URL of figure 1.1 that these residents spend over 100 million hours in-world (logged on) every quarter, translating to over 33 million hours on an average month. These numbers show the size of the user-base and popularity of the VW Second Life.

While the numbers could be misleading in some respects, such as counting pre-programmed avatars called chatbots that are always logged-in, they offer an indication as to the size of penetration and popularity of VW technology and the size of opportunity open for the adaptation of VW technology in education.

Average Monthly Logged-In Users
(thousands)
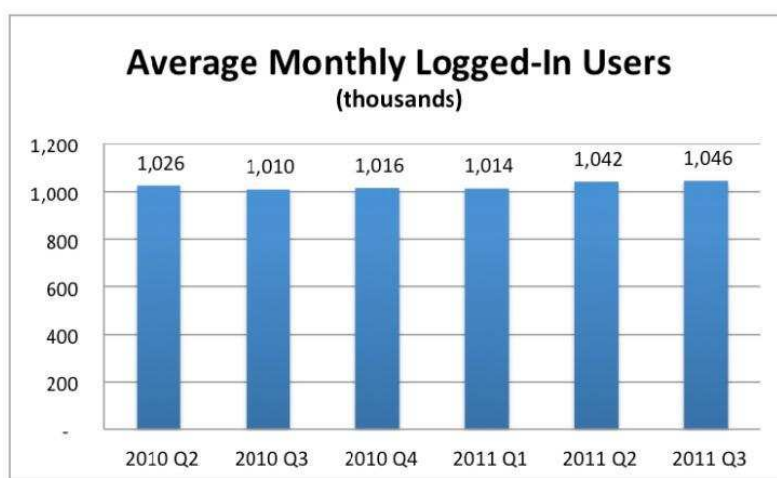
Figure 1.1   Average monthly Logged-in SL users (Source: http://community.secondlife.com/t5/Featured-News/The-Second-Life-Economy-in-Q3-2011/)

One survey of VW activity in higher education indicated that roughly three quarters of UK universities are estimated to be actively developing or using Second Life (Kirriemuir, 2008). In her book 'A Practical Guide to Using Second Life (SL) in Higher Education' Savin-Baden indicated why the VW Second Life (SL) has

penetrated higher education. She explained that SL provides a visual creative learning space, and offers experiential learning opportunities through simulations, demonstrations and experiences not always available in real life, such as education for the professions (Savin-Baden, 2010).

The Open University, for example has been successful in making a diverse and blended learning experience available to distance learners, and this experience has been sometimes supplemented by VWs. The question remains, are VWs sufficient for learning? Or do they need to be supplemented by other types of distance learning to provide a rich learning environment?

1.3.3   Could the Promise of Virtual Worlds be real?

Numerous authors have indicated great potential for learning in VW. Chapter 2 includes a survey of literature on the potential of VWs in learning. Many of the studies cited stressed one aspect or another of the virtue of learning in VWs, and many indicated or implied the potential for VW applications in higher education.

Could VWs one day offer a solution that would fill the large educational gaps noted in section 1.1? Could they be used to align learning with the individual needs necessitated by certain classes of learners? Could they allow the flexibility needed to adapt learning to the requirements of every country, ethnic, political or religious context? Could they be one of the tools that would transform learning according to the conditions created by the global social dynamics?

Answers to these questions remain to be determined by much research effort. What is visible at this point is that findings of research on the educational potential of VWs, along with the statistics on the penetration of VW environments among the online population and in academia, indicate that VWs seem to offer an opportunity for learning languages on an international scale. But is language learning through VWs

comparable to language learning using the traditional methods of learning?

1.4 Research Overview

1.4.1 Research Question

The Virtual World medium seems to offer an advantage over traditional media for language learning, but in order to confirm this advantage and to quantify it, a comparative analysis between the VW medium and traditional media for learning like a face-to-face classroom was required. Based on such an analysis, it might be possible to answer this overarching research question, 'Could language learning be effectively delivered through VW technology as compared to other, more conventional media?'

1.4.2 Research Time Table

Towards answering that research question, a pilot and two studies were conducted in 2007, 2008 and 2009 respectively. Arabic language classes were delivered to groups of language learners in the UK using different media of language learning; face-to-face classroom, Videoconferencing classroom, and Virtual World classroom. The VW medium language learning quality outcomes were assessed both individually and through a comparative analysis between the media.

1.4.3 Research Design

The comparative analysis utilized different class delivery models through the series of studies in order to effectively measure learning outcomes and to engage participants in the comparison process. These included a parallel treatment model and a cross-over model of class delivery.

The Pilot Study was run to get a feel of the research environment that included participants and media, building the expertise needed to steer the research in the right direction towards answering the research question. In Early 2007, 24 University of

Nottingham post-graduate students were recruited to sit for Arabic Language classes. Arabic was of interest to them for career-related reasons as they indicated in the surveys. Arabic was also totally new to them, which was suitable for the research design that required a fresh sample of participants.

Between March and June 2007, a professor of linguistics along with the PhD researcher based at the University of Balamand in North Lebanon, both of whom were native speakers of Lebanese Arabic, delivered six language classes to the UK-based students via videoconferencing. Student pre- and post-attitude surveys were conducted, and informal discussions were held to build on the experience of the participants.

While the Pilot Study did not involve VWs, it was necessary for the PhD researcher to get a feel of the UK research environment including participant recruitment and attitudes, as well as the affordances of the VC medium which was later compared to the face-to-face and the VW medium in Study-1. Experience built by the PhD researcher in language teaching during the Pilot Study was essential for running Study-1 and Study-2.

After the Pilot Study, pilot experiments took place, through building VW spaces that were suitable for language learning. The development of the VW learning space took place in stages in light of available VW islands and resources.

The learning space design was rooted in the experience gained during the delivery of Pilot Study language classes, and on a set of design requirements which were drawn from literature on learning opportunities offered by VWs. The learning space was designed to meet specific educational needs, such as supporting role play and self-managed vocabulary and pronunciation practice. Once the design was developed, it was used in the delivery of VW language classes in the framework of Studies 1 and 2.

Study-1 used the parallel class delivery model for delivering classes in parallel to three homogeneous groups of participants through face-to-face, videoconferencing, and Virtual Worlds media, in order to access the unique advantages one learning medium had to offer over the others. A language aptitude test called the MLAT was employed prior to the Study in order to evenly spread participants across learning groups, and to minimize the effects of dropouts on the homogeneity of groups.

Study-2 used the cross-over class delivery model for delivering classes through two media, face-to-face and VW, to two homogeneous groups of learners, where each student studied through one method for half the sessions then swapped to the second method for the remainder of the learning time. This model allowed for comparing learning outcomes across media, and also gave participants the opportunity to experience both media being compared. The participant experience was documented through surveys and interviews that provided insight for the comparison process.

1.4.4   Research Methods

Several research methods were employed in the studies. Participants across the three studies completed personal-data questionnaires and pre-study attitude surveys, to gather participant information and record their attitudes towards language learning and the media of learning. After classes were over, participant learning outcomes were assessed, and participants were asked to fill a post-study attitude survey to get their impressions and thoughts.

Interviews were also held with participants in order to collect any information that might not have been captured through the post-study attitude surveys. Class interactions were video recorded and analyzed through the critical incident technique identifying patterns of successes and failures during the learning process.

1.4.5   Significance of the Research

It remains early to fully judge VW technology, which is still at an early stage of development. It is however essential to run such research studies in order to discover limitations and shortcomings so as to draw conclusions and recommendations that inform future cycles of development of that technology. While many studies have investigated certain aspects of learning in VWs, this is one of a few studies that take a holistic approach in comparing VWs and traditional media of learning. The comparison between media spanned the learner experience as well as the learning outcomes.

Although the results of this project did not favour the current state of the VW Second Life when compared to face-to-face classroom, high potential still remains to be exploited, and the recommendations chapter highlights such potential and shows where improvements could be implemented for language learning in VWs, and what further tools and methods could be utilized for future research in this area.

1.5   Thesis Overview

1.5.1   Thesis Structure

The thesis is written in nine chapters. After Chapter 1 introduces the research motivation, design, and methodology, Chapter 2 covers a survey of the literature on various foundational concepts of the research such as how learning theories conceptualize the potential of VWs in learning. The chapter then conveys a summary of research projects conducted on language learning in VWs.

Chapter 3 focuses on the methodologies used for the research project. It draws comparisons between the class delivery models justifying the ones used, and gives background information on the research methods utilized, how they were used, and why they were appropriate for answering the research question.

Chapter 4 presents a comprehensive coverage of the Pilot Study, describing its background, motives, objectives, learning environment, timetable, class events, results, shortcomings, and successes in achieving its objectives, leading to a set of recommendations for further studies.

Chapter 5 is dedicated to cover the VW environment design. The chapter starts with an overview of the stages of development of the environment including an account of the administrative decisions that were taken leading to the design. A description then draws on pilot work to explain technical issues with 3D voice and other technical features of the VW environment.

Building on a set of design requirements for the VW learning space, the chapter then goes on to describe a set of interactions that were utilized for the purpose of the studies, and concludes with a group of potential learning interactions and learning tools that could be utilized in a VW learning environment.

Chapter 6 gives an account of Study-1, which built on the Pilot Study to conduct an experimental intervention more tuned and suited to answer the research question. Study-1 participant recruitment, compliance with research ethics requirements, design, technical requirements, and background of participants are outlined. Study-1 description is then illustrated with photos of various class activities that took place along with the research environment where it was conducted.

Chapter 6 also covers Study-1 results, including attitude survey results, assessment results, interview results, and critical incident technique results. The chapter summary outlines the successes of Study-1 in achieving its objectives, and a recommendations section showing its limitations and areas of improvement.

Chapter 7 covers Study-2. It starts with a description of the similarities and

differences between Study-1 and Study-2, justifying a need for running the Study. Study-2 formalities, design, description and results are then explained, with a detailed account of one of the VW classes, illustrated with photos. Study-2 results and findings are then outlined, followed by a set of limitations and recommendations.

Chapter 8 is dedicated to discussion of the results from the three studies. VW learning space design criteria, as well as Pilot Study, Study-1 and Study-2 results are critically analyzed in light of the overall research experience acquired, the limitations of the designs of the Studies, and the research methods used. Findings of the research project are then outlined giving a coherent summary of the experience built from running the three studies combined, through a revisit to the original research question.

Chapter 9 contains a list of recommendations which are based on the knowledge acquired from the results and the findings of the three studies. It outlines opportunities and challenges posed by VWs. It does that from three perspectives, the designer's, the tutor's, and the student's perspectives.

A set of limitations is then presented that reflects on the research experience as a whole and on particular events or observations within certain studies. The discussion of limitations thus covers participant selection, the research environment, the VW design environment, and the technical environment to run VW classes with maximal efficacy. The chapter ends with a set of recommendations for further work and a summary.

1.5.2   Summary of Findings
Pilot Study findings informed Study-1, and Study-1 findings informed Study-2. Pilot Study findings were not specific to answering the research question. They contributed to clarifying the research environment for the better running of the sequel studies.

Study-1 yielded comparable results across the three media used for language learning delivery, leading to the assumption that VW media could effectively be utilized to deliver language classes of comparable quality to language learning. The population of participants from which these results were drawn was however very small, with only two participants completing the VW classes. There was thus a question on the reliability of these results.

Study-2 findings were considered more reliable than those of Study-1. The same eleven participants who started Study-1 completed it. The performance of the VW medium was found lacking as compared to the face-to-face medium. The results were consistent across surveys, interviews, and assessment results.

The results of the assessment of VW learning outcomes came far lower than face-to-face assessment results, and this finding was consistent regardless of the order of class delivery, whether before or after the crossover between media. The same result was also acquired per lesson, regardless of the group that took that lesson.

1.5.3   Summary of Recommendations

Recommendations include a set of conditions which would have been more suitable in organizing the comparison between media. These span participant selection, motivation, length of the Study, and class delivery model.

Recommendations also span a set of technical requirements for VWs necessary for avoiding pitfalls while using the VW technology for learning. These include 3D sound, navigation controls, user and field of view. Recommendations conclude with a set of design factors aimed at improving user experiences while using VWs, such as possible interfaces and interaction scenarios. The design factors also include tools that facilitate teacher adaptation of the technology.

1.6   Chapter Summary

This chapter has introduced the motivation behind investigating learning media such as VW in language learning. The chapter rooted the promise of VW media in language learning in previous research that showed a potential for VWs in learning. The popularity of VWs was introduced as a factor that founded that promise. The chapter described the research environment, including the research question, the design of the research studies and a timetable of their execution, the methods used during these studies, along with the significance of the research, and its major limitations and challenges. The chapter concluded with an overview of the thesis. The content is described chapter-by-chapter, and the major research project findings are summarized, as well as the major recommendations that are based on research results.

Chapter 2

Literature Review

2.1   Introduction

This chapter lays the foundation of the research project by grounding the main opportunities for learning offered by VWs in the theoretical framework of literature on learning research. The chapter starts with survey of online language learning and the associated research issues. The growing need for language learning is exposed leading to a new form of delivery. A survey of research on learning in VWs is presented in two sections. The first section covers research conducted in the period between 1989 and 1999, since this is a period when virtual reality technology that stands behind VWs was being extensively researched for learning. The second section covers the period between 1999 and 2010, a period during which VWs became widespread and well known. The survey of literature on learning in VWs concludes with a summary of the potential learning opportunities offered by VWs.

The learning opportunities of VWs are then projected over language learning. Major projects on VWs for language learning are outlined, followed by a survey of research studies in the area of language learning in VWs, covering major outcomes of these studies. A critical discussion of the research is then presented, followed by a section on how the previous research informed the PhD research study.

2.2   Online Language Learning

2.2.1   Growing Needs
Language Learning is a growing need around the world. Global business, political, and social trends are requiring the learning of languages. Thriving economies like

China's require a population versed in new languages. More people are migrating for employment and need to learn languages. Conflicts around the world require diplomats as well as soldiers in foreign countries to achieve language skills to be able to interact with locals. Adult learning and homeschooling trends explained in Chapter 1, section 1.2, along with an array of documented and referenced economic, political, and social dynamics require that language learning material is available to learners inside as well as outside the context of the University Language centre or Language course.

2.2.2 Online Language Learning Timeline

No trend emerges from vacuum. Technology has been used for decades in language learning, where radio, film, television, audio and video tapes, as well as computers and interactive video has been used in language classrooms and labs since the eighties (Cunningham, 1998). The trend advanced with computers and computer applications that integrated multimedia with language learning and the emergence of the Computer Assisted Language Learning (CALL) movement (Pusack et al. 1990). The use of technology in language learning was further enhanced by the widespread adoption of the Internet that rendered inter-cultural boundaries wide open for social, cultural, economic and academic exchange.

The pedagogical benefits of computer technology facilitated by email and applications like Daedalus Integrated Writing Environment (DIWE) became commonly discussed topics in foreign language learning literature and Computer Mediated Communication (CMC). Daedalus' InterChange component allowed authentic conversations with others in the target language and was projected as an excellent medium for building meaningful collaborative cross-cultural human interactions among members of a discourse community within or across classrooms created in cyberspace (Salaberry, 1996). Interchange was commended for promoting students' equal participation in the classroom (Chun, 1994) and for the facility to save a session and reflect on previous interactions, giving learners an opportunity to review and monitor their own language

production.

Online applications such as email and synchronous chat were found to enhance communicative language skills (Kost, 1999). They presented an opportunity to share and collaborate (Hellebrandt, 1999), and were found helpful in developing critical thinking skills. Chat, for example, "cultivates the ability to think and compose spontaneously" (Kroonenberg, 1994).

As the Internet became mainstream, and as Internet technologies developed, more integrated online language-learning approaches became commonplace. Today, many commercial websites offer language learning services to large communities of users including websites such as Busuu, Livemocha, LingQ, and Hello-Hello. These websites offer gradual language lessons with increasing difficulty in several languages.

The lessons are offered with many multimedia features such as audio flash cards with automatic translation and videos of native conversations. Assessment sections include matching vocabulary, listening, sentence creation, as well as writing and speaking submissions. Features offered include file download for offline review, and learning companions who are native speakers of the target language. Lang-8 for example offers writing correction by native speakers, while Rhinospike offers the text of the user's choice recorded by native speakers. Other features are unique to each provider such as the site Yabla that offers subtitled videos in the target language.

2.2.3   Research Issues

A 2003 review of CALL empirical research projects concluded that there is evidence suggesting that "technology-based language instruction can be as effective as teacher-delivered instruction in terms of overall effectiveness of technology on language learning" (Zhao 2003, p 20). The author cautioned that the results are to be analyzed

in perspective of the tendency for journals to publish studies that report significant positive gains. He also noted that the number of systematic, well-designed empirical evaluative studies of the effects of technology uses in language learning is very limited, and the settings of instruction where the studies were conducted were limited to higher education and adult learners. Moreover, the languages studied were limited to common foreign languages and English as a foreign or second language, and the experiments were often short-term and covered one or two aspects of language learning, such as vocabulary or grammar (Zhao, 2003).

Felix (2008) claims that while there is enough research in CALL to suggest positive effects on spelling, reading and writing, more research is needed in order to determine its effectiveness in areas like speaking online. While the students' perceptions of CALL are positive, Felix (2008) states that CALL technologies need to be stable and well supported in order to avoid technical problems that may interfere with the learning process. She also notes that younger students may not possess the necessary skills for coping effectively in the challenging new environments, while older students may not feel comfortable with computers (Felix 2008). This implies that training in computer literacy for students, and also for teachers is essential. She adds that in order to achieve meaningful results while conducting CALL research, the analysis should involve the same group of students in both experimental and control treatment for a certain amount of time, with groups switched more than once where possible (Felix, 2008).

Another noteworthy issue in conducting empirical research is the relationship between the effectiveness of technology on language learning, and how that technology is used. Certain learning tasks for certain learners are best achieved by certain technologies, therefore research is needed about appropriate ways and contexts of technology use (Salaberry, 2001).

2.3 Research on Learning in Virtual Worlds

2.3.1 Personal Virtual Worlds

Virtual Reality, a technology that has been around for decades, spans a wide spectrum of technologies, interfaces, and degrees of presence. This technology was implemented in several ways. One way was through simulation rooms called CAVE Automatic Virtual Environments (CAVEs) with screens around to give the person inside the simulation room a sense of presence (Cruz-Neira et al., 1992), another through head-mounted displays, where the user saw a different perspective through each eye, leading to a sense of immersion. Sensory input-output devices like touch (Sturman, 1994) were also utilized, and as early as 1956, Morton Heilig suggested using an odour generator to activate the sense of smell, thus increasing the sense of immersion.

VR technology was however expensive and restrictive to the average computer user. VWs, which build on VR technology, were designed to run on personal computers (PCs) in order to be accessible to large populations of PC users, opening the door for their large-scale adoption. The widespread use of desktop and laptop personal computers facilitates the penetration of VW technology to over 32% of the World's population, translating to over 2.2 billion users with Internet connectivity (Internet world Stats website, 2012). And while an undetermined percentage of those users might not have the hardware, graphics, or bandwidth to connect to VWs, computer hardware is rolling out very quickly, and Internet bandwidth is becoming cheaper and more abundant, making it a matter of time before these requirements are met and exceeded.

According to Robertson, Card and MacKinlay (1993), desktop 3D environments can be easier to use than immersive environments such as those requiring head-mounted

displays, or room-like simulation areas such as CAVEs, because people are already familiar with controlling the desktop computer, and are thus less subject to the physical and psychological stress often associated with immersive environments.

For the ease of use of VWs on desktops, for economic reasons, and for the widespread use of the Internet, VWs have become widely adopted by PC users worldwide, and over 300 million registered users spend part of their time within commercial social and gaming virtual worlds (Hays, 2008, cited by Spence, 2008). For these reasons, the majority of empirical research studies on learning in VW conducted between 1999 and 2009 were based on desktop VR (Mikropoulos et al., 2011), and these are also the main reasons behind adopting desktop VWs for this research study.

2.3.2 Survey of Literature (1989-1999)

Much like any VR-based system, VWs offer opportunities for learning in places that, among other features, are impossible or restrictive to visit, such as historic landmarks that were demolished (Alberti, 1998), or distant planets, or the ocean floor, or even molecular structures (Wann et al., 1996). Travelling through deep space at the speed of light or faster, or travelling through the human body, or even interacting with molecules are tasks which are out of science fiction and into personal computers running simulations.

VWs have also a useful application in the development of skills that are dangerous or expensive to practice. Training nuclear power plant workers (Winn et al., 1999), or preparing astronauts for the repair of a space telescope (Moore, 1995), or training potential pilots like that mentioned in the preface using flight simulators, which are available in various forms, from the large cockpit simulators to desktop flight-simulation applications.

The situated nature of learning in VWs has also been studied (Ruzic, 1999). Drawing

on Brown, Collins and Duguid's theory of situated cognition (1989), McLellan (1996) also notes the potential for 3D VWs in situated learning. Other authors have studied presence like Brown (1996) and Lave (1991) and have confirmed the positive effects of a learner being situated in a certain simulated environment on the learning process. Motivation is an attribute of VW environments that can offer a major benefit to learning. The degree of realism available through VWs offers its users a feeling of flow while carrying out activities. Learning activities can be so engaging that the learners' mental focus is shifted away from the surrounding day-to-day stresses of life, allowing them to focus entirely on the task (Csikszentmihalyi, 1991).

Avoiding learner split attention is another benefit of VWs. Sweller's cognitive load theory (1998) argues that combining different types of representations such as audio, text, and imagery into a single representation would reduce the load on the learner's working memory while delivering instructions, and would focus the learner's attention to achieve better learning results.

One of the very promising aspects of VWs for learning is offering the learner the chance to interact with objects through manipulating them and so to experience certain specific outcomes designed for learning. Associationist theory for adult learning is derived from Thorndike's (1928) early work. The learner makes an association between stimuli and responses and learns in the process.

LOGO creator Seymor Papert argues in his theory of 'constructionism' that learning by working on personally-meaningful projects is better than learning by being told (Papert et al., 1991). Similar conclusions have been reached based on evidence from research on text-based virtual reality environments (Bruckman, 1998).

Much of what we learn in our daily life is based on 'first-person non-symbolic' experiences we have with the world around us. Face-to-face learning environments

however lean towards 'third-person symbolic experiences' as the primary means of education. VWs thus provide for learning experiences not available to students in a traditional classroom setting (Winn, 1993). According to Winn, learning in 3D VR environments supported by constructivist theories such as that of Vygotsky, provides users with a new set of tools for building knowledge that may have previously only been available through third-person symbolic accounts. Winn (1993) provides a solid understanding, as well as arguments about how 3D environments offer new tools for more and fuller access to knowledge construction.

The research on learning in VWs has mainly adopted the socio-constructivist perspective, which views learning as a social activity rather than as an individual cognitive process (Vygotsky, 1978; Lave, 1991). Within this perspective, collaborative learning is important because it provides opportunities for learners to learn from other learners in a group. Learning is done through adopting new roles, sharing multiple perspectives, offering peer tutoring, and conducting tasks that would be difficult or impossible for a single learner (Johnson et al., 1996).

Along with peer communication, VWs provide the opportunity for learners to construct their identities and roles. Using unique names and identities provides trust and accountability required by users of a collaborative learning environment, and also enables users to assume a new personality or role that might not be available to them in a face-to-face learning environment. The ability of learners to re-define themselves has been proven important to learning in text-based virtual environments. (Bruckman, 1997; Dede, 1996) and could be an equally important feature of VWs available today.

Learners in VWs are also able to construct their own 3D environment. The option of building in a VW provides educators and learners the means to self-define the context of the learning environment as well as the opportunity to learn by interacting with objects within the simulated environment (Dickey, 1999).

Other opportunities for learning are offered by VW. Students with cognitive disabilities can learn complex concepts with greater physical and emotional safety and in a more cost-effective way (Powers et al., 1994). Learning opportunities also include flexibility of learning at any time wherever the learner may be located, learning individually or within a group (collaborative learning), and learning formally or informally.

To sum up ten years of research on VR systems and text-based multi-user online environments that were popular in the 1990s, evidence was mounting that these technologies have something to offer to learning. Research has shown advantages for VR in certain learning scenarios, and for certain classes of learners. It was also shown that the educational potential of VR could be extended to any learner and in any scenario, due to the immersive nature of the technology, and due to its direct support of the processes that govern how people learn, like social and experiential learning.

2.3.3   Survey of Literature (1999-2010)

Research projects on VR technology during the 80s and 90s have established its potential for learning. Several other research projects explored the learning potential of such environments during the 2000s, and it is during this decade of research that text-based or video/chat enabled virtual reality environments turned into immersive VWs with audio and video capabilities. A survey of the literature during that decade was thus of importance.

Mikropoulos et al. (2011) conducted a ten-year critical review (1999-2009) that involved 53 articles, papers, and book chapters describing empirical research on the educational applications of Virtual Reality (VR). The research studies were selected according to certain criteria ensuring the adequacy of the methodology, data collection and analysis (Mikropoulos et al., 2011). The review examined the educational context of the research studies, the features of VR exploited by the virtual environments, and

the learning theories that authors followed and applied in their research studies. The review covered peer-reviewed empirical research studies published as full length articles written in English in scientific journals, proceedings of international conferences, symposia and workshops, as well as book chapters. Only papers describing formal and mainstream education were included in the review.

Out of the 53 studies, four used CAVE environments, one used a data glove, and the 48 remaining studies used desktop virtual environments with a keyboard and mouse as the interface. According to the reviewers, the widespread research on desktop virtual environments is due to the low cost associated with such systems and the familiarity of research participants in using them. Since the PhD research project deals with desktop VWs, the results of the studies reviewed are considered suitable for the literature review and applicable for reference purposes.

According to Mikropoulos et al. (2011), only a few authors of the reviewed empirical studies clearly state the theoretical learning model they followed for both the design and use of the virtual environments. Most of those who stated the model used constructivism and its various types such as social constructivism, situated learning and constructionism as their theoretical approach. Some other studies implied constructivism, shown by the terminology they used, others referred to experiential learning, inquiry-based learning, collaborative learning, guided discovery learning, and learning by doing. The reviewers attributed the diversity of theoretical models used to the diversity in author backgrounds, some of which were educational technologists, some educators, some cognitive scientists, and some others were psychologists.

A variety of data collection methods were used in the studies of the reviewed articles. Most of the studies used more than one method for data collection. There were questionnaires, interviews, observations, various types of recordings, log files, and

completion of tasks in the environments. Knowledge assessment methods included questionnaires, interviews, success in task completion in the virtual environments, and students' submissions (papers, pictures, stories, quests, etc.) (Mikropoulos et al., 2011).

All the studies mention characteristics of participants such as gender, age and computer experience, but only a few of them relate learners' characteristics with the virtual learning experience. For example, in a study conducted by Trindade et al. (2002), participant high spatial ability was linked to an increased conceptual understanding of some learning contents. In another study, it was found that prior computer knowledge may decrease the feeling of presence in the virtual environment (Goncalves, 2005). Another experiment by Virvou and Katsionis' (2008) showed that the less experienced users of virtual environments faced usability problems due to their lack of acquaintance with the interface and had to exert effort during navigation. The same experiment showed that the more experienced users were distracted during learning in the virtual environment.

Only 17 studies commented on students' or teachers' attitudes towards the use of VR in the learning process. Positive participant attitudes towards virtual environments has been reported in different studies (Lim et al., 2006; Minogue et al., 2006; Ni et al., 2006; Robertson et al., 2003; Sato et al., 2008; Shim et al., 2003; Virvou et al., 2005). Crosier et al.'s (2000) results indicate that both participant ability level and the order in which the conditions were completed significantly affected the attitude scores. Teachers' attitudes were also positive despite difficulties some faced in implementing the technology in their classes (Goncalves, 2005).

The addition of haptic feedback was shown by Minogue et al. (2006) to have a positive impact on user ability to navigate in 3D virtual environment and have raised their interest and improved their attitudes towards learning in virtual environments.

Most of the studies claimed that subjects remained engaged throughout their interaction with the virtual environments (Johnson et al., 2004, 1999; Marshall et al., 2004; Patera et al., 2008; Sato et al., 2008). On the other hand, only the student who had the role of the leader of the group remained engaged (Roussos et al., 1999). The level of engagement of students was low in the study of Lim et al., (2006).

Reasons for low engagement spanned distractions in the virtual environment, difficulty with language used in the environment, lack of computer competency by users, and their inability to complete the quests. However, the same researchers believed that a student could be engaged in the virtual environment by exploring the different worlds, avatars, and quests, but fail to engage in the learning tasks.

In the same review of the 53 studies, Mikropoulos et al. (2011) focused on cognitive learning outcomes such as comprehension, knowledge, application and analysis (Sharda et al., 2004), and found that the learning outcomes in almost all the reviewed studies were positive. Only three studies presented negative learning outcomes. These included Crosier et al. (2000) who did not find obvious benefits for the use of VR over traditional teaching methods, and Patera et al. (2008) who stated that there was no indication of a benefit in the motivation and creativity measures that were used. The review also concluded that social science researchers seemed to appreciate the value of VR in education, and have projected learning goals for virtual environments (Mikropoulos et al., 2011).

The sense of presence was considered to be an important feature of virtual environments (Mikropoulos et al., 2004). Almost all of the researched virtual environments that were reviewed exploited free navigation and first person point of view, features that mainly lead to first order experiences according to the reviewers. Participants of 19 studies indicated they had the feeling of 'being there' which might have contributed to positive results. In three studies (Kontogeorgiou et al., 2008;

Mikropoulos, 2006; Winn et al., 1999) students had a high sense of presence while interacting with the virtual environment which helped them perform their learning tasks successfully. Students in other studies indicated that their sense of presence helped them to stay focused during their exposure to the virtual environment (Robertson et al., 2002; Robertson et al., 2003).

The review pointed to features unique to VR environments that could be exploited for pedagogical goals. VR environments allowed the creation of 3D spatial representations that offer multisensory channels for user interaction, a sense of immersion of the user in the environment, and an intuitive interaction through natural manipulations in real time (Mikropoulos et al., 2011). Reviewers indicated that little can yet be concluded regarding the retention of the knowledge acquired in virtual environments. They agreed with what was suggested by Hew and Cheung (2010) that further longitudinal studies were necessary.

In the same review (Mikropoulos et al., 2011), authors noted that there were no virtual environments that exploited all the unique features of VR. In conclusion to the review paper, the reviewers agreed with Dalgarno's and Lee's (2010) statement that a systematic effort and more empirical studies were needed in order to show how to pedagogically exploit the characteristics and features of virtual environments.

2.3.4   Learning Opportunities in VWs

Opportunities for learning in VWs span a number of methods. These include learning-by-familiarization to complex issues, learning-by-experimenting with actions and reactions, learning-by-doing when tasks are restrictive in the real world, learning-by-being through role-play activities using self-chosen VW identities, learning-by-exploring through scavenger-hunt type assignments or in-world simulations or real-life phenomena, learning-by-championing, where leaders are assigned to groups, or where in-world learners are requested to promote real-world issues, learning-by-

collaboration, and many other possibilities. A summary of opportunities for learning offered by VWs along with the type of learning taking place is included as Table 2.1.

Learning Opportunity	Type of learning
Familiarization with inaccessible and complex environments	Learning by seeing or visualizing
Skill building in expensive or dangerous tasks	Learning by doing
Situated learning in naturalistic contexts	Learning by going
Compare actions with reactions	Learning by experimenting
Reduced Cognitive Load	Learning by multi-sensory simultaneous inputs
VW environment and object control	Learning by building
Interacting with objects	Learning by oneself
Interacting with peers	Learning by collaborating
Scavenger hunts for learning	Learning by exploring
Promoting real causes in-world	Learning by championing
Identity control and role control	Learning by being
Free expression – less inhibitions	Learning by autonomy
Increased Motivation	Learning by interest
Understanding of complex ideas	Learning by simplifying abstraction
Learning any-time any-where	Learning by opportunity

Table 2.1   Summary of Learning Opportunities in VWs

Other research work performed and other experience built by managers and practitioners of learning activities in VWs such as SL has also shed light on both opportunities offered and the challenges posed by such media for learning. In her

book 'A Practical Guide to Using Second Life in Higher Education' Savin-Baden outlines a set of possible reasons why the VW Second Life has penetrated higher education (Savin-Baden 2010, p8).

- It provides a visual learning environment that is a creative learning space
- Its very openness interrupts not only teaching and learning practices but also issues of power and control in learning
- It offers experiential learning opportunities, chiefly in terms of using simulations, demonstrations and experiences not always available in real life, particularly in education for the professions
- It serves as a mirror to higher education practice across different levels

While this set of values intersects with traditional technical lists of advantages of using VWs in education like that of Warburton (2009), it also gives an insight into how educators should capitalize on an opportunity offered by VW to higher education. Savin-Baden (2010) describes SL as a social medium where informality, ingenuity and wit are valued. This VW is envisioned by Savin-Baden as a space for reflection, relaxation, and innovation.

The author cautions that there will be downsides to openness, and the University administrators and staff alike would be sceptical about the purpose and methods of using this open space. But the very introduction of SL introduces the questions of why teaching and learning are carried out in a certain way, and whether this way is the best way, and this kind of mirroring could, if utilized, offer transformational benefits to the Higher Education. The author proclaims that "In many ways I would suggest Second Life introduces questions about pedagogy, practice and how learning might be improved and enhanced" (Savin-Baden 2010, p8).

Other opportunities for learning are offered by VW. These include learning when the class environment is inaccessible either due to war or oppression (O'Malley, 2010), or

when the learner is ill or physically handicapped, or with a certain learning or cognitive disability that requires special attention (Smedley, 2005). While these opportunities for learning have been explored in the eyes of a spectrum of learning theories in several domains and disciplines of learning, much research remains needed in order to focus subsets of these opportunities in the context of the learner situation and learning styles, on the social and academic adaptation of learning in VWs and its implications on teaching and institutional models, and on the specificities of the subject matter being delivered through the VW. This research project focuses on the specific domain of language learning by exploring both the opportunities and challenges of using VW as the language learning medium.

2.4   Language Learning in Virtual Worlds

2.4.1   Language Learning Opportunities

While most of the learning opportunities offered by VWs are applicable to language learning, the first-person form of experiential learning is the most unique and powerful characteristic of 3D virtual environments in language learning (San Chee, 2001). With such environments, students would immerse themselves in realistic settings for learning the target language.

Students are also able to learn autonomously through their VW immersive experiences. Autonomy would give learners control over their learning experience. Student autonomy in learning and problem solving foster a sense of ownership of the activity at hand, and language learning curricula could be designed to engage language students experientially in many possible situations (San Chee, 2001).

The cultural aspect of communication and collaboration in VWs is an important factor in the success of the immersed experience. The VW is an open inter-cultural environment where students can potentially meet with native speakers of the target language to engage in written and spoken communication in real-time.

Unlike what happens in real life, either text-based or spoken conversations with complete strangers is a key feature of the SL culture and is considered absolutely natural. This openness of VWs can only increase the opportunities for language practice (Vickers, 2007).

VWs thus seem to offer a suitable medium for language learning. The suitability in based on the affordances of VEs for sound pedagogical and social approaches, through an interface readily available to the masses of Internet users, at a time when the demand for language learning grows in an increasingly open world.

2.4.2   VW Language Learning Areas

Virtual language academies operate in the VW SL like Avatar languages and Language lab. The British Council has also opened a self-access centre island for teenage language learners in the teen grid which is a part of SL exclusively used by teenagers and approved adult educators. Several other areas for language learning include Real Town, SurReal Quests, and Instituto Cervantes (Stanley, 2008).

Free areas for language learning in SL include the region maintained by the Goethe-Institute and the EduNation Islands. Projects on Language education in SL include Niflar and Avalon projects. Niflar was implemented both in Second Life and in Opensim, the open source version of SL that runs the VW on a private isolated server (http://cms.let.uu.nl/niflar/). While the VW Second Life has been popular in academia, there are only a very small number of limited and in-progress pilot study investigations that have specifically examined language learning in these settings (Thorne et al. 2009).

2.4.3   Survey of Literature

Sadler and Nurmukhamedov (2008) conducted a study on English-as-a-second-language students taking classes in the VW SL. The study found that student

motivation was maintained while conducting task-based learning activities, and learners generally achieved task completion that included substantial interaction in the second language. Another study examined the role that the VW Second Life can play in teaching Chinese language and culture. The study found that Second Life presented opportunities for negotiation for meaning and high levels of engagement for the participants (Zheng, et al., 2008).

Thorne et al., (2009) comments on the above two studies by saying "These initial explorations were congruent with, but fundamentally do not significantly extend, findings from previous negotiation-oriented studies that have focused on purely text-based synchronous CMC (Computer Mediated Communications) chat spaces (e.g., Abrams, 2001, 2006; Blake, 2000; Smith, 2003, 2004)." (Thorne et al. 2009, p809). In another study by Zheng et al. (2009) on the effects of VWs on language learners' attitudes and self-efficacy, results indicated that virtual worlds may provide a space for English language learners in the United States and other countries to increase confidence and comfort and to overcome cultural barriers for learning English.

In a study of oral (voice-chat) participation in SL involving task-based design of two language proficiency courses, it was found that authenticity and collaborative elements have a direct impact on learner participation and engagement (Deutschmann, et al., 2009). The study concluded that much of what has been found in research into task design aimed at more traditional audio-synchronous learning environments can be applied also to SL. Authors concluded that there was much left to be done especially in the area of multimodal usage of SL before beginning to seriously evaluate the potential benefits of VW environments in language learning (Deutschmann, et al., 2009).

Blasing, (2010) described a study of Russian language teaching using text-chat rather than voice chat. Text-chat was used in the study despite the results of an interview she

conducted 42 foreign language instructors who were familiar with Second Life, the majority of which believed that voice-chat was more beneficial to language learning than typed chat communication. The author indicated that "teaching language in an online environment requires investing a significant amount of time and energy in creating learning spaces and activities for students that correspond to specific learning goals." (Blasing 2010, p115)

The author however reported that "advanced level language students can gain additional full-immersion language practice in Second Life through interactions with target language speakers in-world", and "tasks for learners of all levels can be designed and implemented, some with relatively little investment in the technology" (Blasing 2010, p115).

Recent research projects that have researched and explored VWs for language learning include the AVALON project (http://www.avalonlearning.eu/). It was conducted over two years and concluded in December 2010. After comparing several VWs, the project created and tested language-learning tasks and courses based on the VW Second Life. The results were used to run a teacher training course based on best-practice guidelines and educational models. The project provided a series of open online repositories of tested teaching and learning materials, and created an online open teacher community for language education in virtual worlds for teacher development and for sharing materials and best practices (http://avalon-project.ning.com/group/slexperimentsteachersgroup).

NIFLAR (Networked Interaction in Foreign Language Acquisition and Research), is another project that aimed at making foreign language education more naturalistic, relevant and rewarding through utilizing innovative e-learning environments such as video and web-conferencing and 3D VWs. The project has examined the affordances specific to VWs as compared to videoconferencing. The results of comparative

research between the two platforms indicate that VWs offer a motivating and engaging environment with an impact on Second Language Acquisition, in particular when the task design makes uses of the specific features of the environment (http://cms.hum.uu.nl/niflar/).

The V-lang project (2011) is another recent project that explored the potential of language learning in VWs. The outcomes of the project included a Toolkit which contained a manageable VW with a virtual village, virtual classrooms and meeting halls, and online software for the management of teachers and student experiences. A set of guidelines was also generated for the integration of online/blended and virtual learning (http://www.v-lang.eu/section/about/).

The AVATAR (Added Value of teAching in a virTuAl world) was a two year project (December 2009 - November 2011) co-financed by the European Commission aimed at enhancing the quality of language and science education in European secondary schools through an innovative VW learning experience. The project explored learning-by-doing, stimulating different learning styles and methods, and generating a set of guidelines for utilizing VWs in language education (http://www.avatarproject.eu/avatar/index.php).

Other, more recent projects have been investigating VWs in language learning. The ASSIS (A Second Step in Second Life) project is currently run by the Department of Language Studies at Umea University, Sweden, aimed at developing the teaching of oral proficiency in distance courses of North Sami, Finnish and Spanish using VWs. The educational aim of ASSIS is to exploit the affordances of Second Life and other online tools in language learning (https://assis.pbworks.com/).

VWs other than SL have also been investigated for language learning. Peterson (2006) conducted a study on language learning in the VW Active Worlds, and found that

participants were able to engage in several tasks through target language interaction. He concluded that the learner interaction was influenced by a number of variables including context of use, task type, sociolinguistic factors, and technical affordances provided by the VW.

Berns, et al. (2011) conducted an empirical study on language learning using the open-source VW platform Opensim. The aim was to explore new ways of providing an interactive, motivating and effective learning environment for the teaching of foreign languages. The project built on theory and earlier empirical studies using VWs, with the goal to measure the effectiveness of VW applications on foreign language learning.

The results showed that VWs can be used from beginner to intermediate to higher language levels, but they have to be used in different ways and according to student specific needs and language skills at each language level. Beginners for example benefitted from playing games inside the VW, with the goal of achieving specific and clear tasks individually as well as through interaction with others. Students felt more relaxed and free from fear of failure in game-based VW environments than in traditional learning environments.

2.4.4   Critical Review of Literature

There are a number of critical issues that emerge from the literature survey. These issues include the absence of a research agenda that guides the implementation of empirical research projects, which leaves the research scene clattered with results that have little in common that unite these results into a definitive coherent whole. While this is expected as different individuals and groups conduct empirical research work, it is also expected that bodies such as governments that have the capacity to sponsor and guide research projects should set a research agenda that guides its own spending on educational programs, projects, and initiatives, making the best out of its resources,

and serving the research community in the meanwhile. This is not saying that the problem would be totally solved, or that the existing research situation is useless. There will always be a place for innovation as individual researchers and research groups explore new methods, media, and means outside a global research agenda.

Another critical issue is a source of research bias that leads to a partial one-sided view of facts. The tendency of journals to show positive results, and the zeal of researchers to find them, generally drives research publications into a direction that focuses on the positive aspects of using technology in learning, and this leads to view which is not very reliable. This trend is supplemented by the average research project participant that enjoys new technology and reports positive outcomes due to this new-found motivation. Add to all these the researcher bias that sets out to explore and discover, assuming all that is new is good, or at least better than the old. This also leads to results that are not in total accordance with facts. The PhD researcher was one of these researchers that took a positive outlook on the new medium of learning being explored, to be later disappointed with its shortcomings.

A third issue is the focus of most research projects on certain languages leaving others, and on certain groups of learners leaving others. Add to that the relative short time-span of most of these empirical research projects, and the results of these projects would be partial by every measure. Learning a second language in a comprehensive way takes more than one semester or even one year, and getting the participant used to a new medium or technology of learning also takes time that is not usually available in the research project agenda. Thus a major problem of the research results in generalization. Even if the results were totally valid for a certain group of participants, with a certain background, studying a certain language, for a certain amount of time, through a certain technology or medium of learning, these results need not totally apply to every participant, studying any language, for any length of time, through any technology or medium, anywhere in the world.

The other demand on empirical research projects is to go into the details of every aspect of technology and its implications on, and interactions with every aspect of language learning, for each group of participants, with a shared aptitude and motivation for language learning, and level of competence achieved in a target language. This demand requires very specific control conditions in order to allow meaningful results to emerge. This demand seems in direct contradiction with the generalization requirement mentioned earlier, unless a comprehensive research agenda is set to coordinate different projects towards achieving a set of results that is useful, and that can be both generalized, and contextualized to certain settings and groups.

One major issue found in the literature review is that technology use is fragmented and isolated, and there are very few comprehensive curricula that take advantage of the full spectrum of available technologies. While it might be a requirement to isolate the individual advantages or disadvantages offered by a certain technology to fully understand how it helps learning, there is a need to understand how different technologies work in synergy to produce maximal learning effectiveness. When this becomes possible, technology affordances would be translated into pedagogical solutions in the form of content and curricula for language learners.

Another issue common to the research projects examined is there lack of grounding in pedagogy. Many a time, the driving motivation behind a research project is none but the new technology itself, where curiosity in exploring this technology, or the feeling that it will work, drives the research efforts. Add to this the spectrum of learning theories available, and the shifts within the research community from one driving theory such as connectionism to another such as constructivism over time, and the constant changes in technology itself with the different driving forces behind those who produce the technologies, including money and fame making, and you have a shaky and undefined ground to build on, as the Bible says, when one blind leads

another, both fall in a ditch (Luke 6:39).

2.4.5   How the Literature Inform the Study

The gloomy picture painted above is not to say that research should seize, but rather benefit from previous work, learning from both achievements and shortcomings to reach further and achieve more. The literature review informed the design of the study in a number of ways outlined below.

One of the findings of the literature review is the focus of researchers on few languages, leaving others. One of these left-out languages was Arabic. The choice of Arabic was hence suitable in order to expand the language learning research, and for several other reasons as well explained in section 4.2.2.

The literature review informed the learning space design explained in section 5.1.2 in the following ways. The collaboration nature of learning views learning as a social activity (Vygotsky, 1978) where students learn from other students in a group through adopting new roles, sharing multiple perspectives, offering peer tutoring, and conducting tasks that would be difficult or impossible for a single learner (Johnson et al., 1996). The VW learning space thus had to allow for real-time audio communication among users to facilitate interactions. The VW learning space had also to be flexible in terms of the configuration of meeting places allowing the teacher to easily configure learning spaces suitable for the learning activity at hand. Ease of adapting to, and using the VW application interface was necessary to facilitate student interactions, so that they would be able to focus on language learning rather than technical details of operation.

Student autonomy in learning and problem solving foster a sense of ownership of the activity at hand, and gives learners control over their learning experience (San Chee, 2001). The VW had thus to be manageable by its users in several ways, starting from choice of identity and in-world apparel, to the individual learning rates, in order to

allow students to learn autonomously through their VW immersive experiences.

Language learning curricula could be designed to engage language students experientially in many possible situations, as first-person experiential learning is the most unique and powerful characteristic of 3D virtual environments in language learning (San Chee, 2001). The VW learning space had to allow for interaction between users and objects that facilitated learning, allowing for individualized learning, and serving to match learning delivery to the rate of learner ability to absorb material.

VWs offer learners interaction with native speakers and language usage in naturalistic contexts, providing a possibility for a less stressful and more enjoyable environment to use the English language (Roed, 2003). The VW learning space thus had to provide for naturalistic settings for learning that would give a sense of presence through role-play activities involving native language speakers during learning sessions.

2.5   Chapter Summary

The chapter started with a discussion of the promise offered by virtual reality and VWs in education due to its characteristics that facilitate learning. A discussion of online language learning and the related research issues followed. An association was then drawn between the growth of VWs and the growth in personal computing. The chapter than went to cover a 20-year survey of research literature on learning in virtual learning environments, leading to what we know today as virtual worlds. During the first ten years from 1989 till 1999, research focused on the educational benefits of VR technology, during which graphics- and audio-based VWs were not yet available. From 1999 till 2009, the modern VWs were researched for their potential in learning.

The chapter built to a list of learning opportunities offered by VWs. The opportunities

spanned a variety of learning approaches and methods. Those opportunities of prime interest for language learning in virtual worlds were outlined, leading to a discussion of research projects conducted in the area of language learning in VWs. The chapter went to outline the main research issues in surveyed literature, and how this literature informed the study design.

While the chapter did not offer a comprehensive coverage research on learning in VWs, it served to ground the PhD research project on the theoretical foundations of learning, and the many ways VWs could help learners. The outcome was a set of VW design requirements explained in section 5.1.2, that were used to design the VW learning spaces for the project, and that were evaluated in light of the outcomes of the studies conducted.

Chapter 3

Research Methodology

3.1   Introduction

3.1.1   Background

Appropriate research methods are an essential component of a successful research study. While qualitative research methods are flexible and suitable for answering the research question at hand, quantitative methods are also needed for drawing a complete picture of the results.

Design research concepts lay a framework to guide the research experimental design towards achieving its goals in answering the research question. This is done through an iterative framework of three studies and several research tools allowing triangulation of results to better determine what the collected data means.

3.1.2   Chapter Overview

The chapter starts with an overview of the research framework used in the PhD research project, including the issues that need to be considered, and an overview of Design Research which was adopted as a framework for the purposes of this research project. The focus then shifts to comparative analysis concepts, including a debate between supporters and sceptics of media comparison studies, leading to a critical stance on the matter. Issues of sampling, validity, ethics and informed consent are addressed in respect to the research Study.

The research design then expands on a set of class delivery models, and justifies why certain models are to be used to determine the effectiveness of the VW medium as compared to more traditional media of language learning. The chapter then explains

the research methods and tools used within this research project, including the concepts related to the design of the virtual learning space, and data collection tools such as attitude surveys, interviews, class assessments, and video recordings, as well as data analysis tools such the critical incident technique that was applied. The chapter concludes with a brief reference to the concept of triangulation of research data which allows a multi-dimensional view of research outcomes.

3.2   The Research Framework

3.2.1   Research Type

While quantitative research may discover trends and directions, qualitative research goes deeper to uncover why people behave as they do, and this is done through probing their knowledge, perception, attitudes, beliefs, drives, fears, etc. Qualitative research allows research participants to indicate or imply 'rich' answers to research questions, through giving valuable insights which might have been missed by any other research method (Frankel, 2000). The effort of assembling and running a qualitative research project limits however the number of participants in such a project. This is due to the large amounts of data to be collected and analyzed from tools such as attitude surveys, focus groups, interviews, and observations of teaching interventions, which are labour-intensive.

In certain cases, the application of a quantitative component within the qualitative research project would allow for better confidence in generalizing its results. Some studies concluded that since quantitative and qualitative research methods provide unique perspectives, they are likely, when combined, to yield a richer and more valid understanding, and hence are more useful when used together than when either is used alone (Gliner & Morgan, 2009).

This PhD research project uses both qualitative and quantitative research methods.

Tools of qualitative research were used including interviews and recorded teaching interventions. Quantitative research tools included attitude surveys and class assessments since they were of merit to the research project by providing insight into the effectiveness of VW medium in comparison to the other media. Analysis of data collected by these tools was carried mainly by the researcher, and the data collected such as video recordings are available for further review. Summaries of surveys as well as other written collected data are included as appendices to the PhD thesis.

3.2.2 Design Research

Design Research or Design-Based Research in Education emerged in the 1990s as a new methodology to evaluate learning interventions. The goal of this methodology is to address theoretical questions about learning in its context, and to study approaches to understand learning in the real world rather than in the laboratory (Collins et al., 2004), allowing to engineer innovation in teaching and learning.

'Design experiments', first appeared in the works of Brown (1992) and Collins (1990), and were the foundation for Design Research, which was conceived to meet the need to develop a design science of education similar to engineering disciplines. Education is not a natural science like Physics and Biology which seek to explain existing natural phenomena (Simon, 1969). In a sense, Education could be viewed as a design science like Engineering and Medicine that aims at investigating how different learning-environment designs affect dependent variables in teaching and learning, with the goal of constructing a more systematic methodology for conducting design experiments (Collins, 1990).

The broad goals of Design Research are to prevent the detachment of educational research from problems and issues of everyday practice (Brown, 1992; Hoadley, 2004), to close the credibility gap (Levin & O'Donnell, 1999), to connect the 'how to' knowledge created by researchers to the local context in which practitioners live, thus

developing more 'usable knowledge' (Lagemann, 2002), while preserving universality of research results (Design-Based Research Collective, 2003).

Design Research could integrate qualitative and quantitative research as needed. It utilizes mixed methods in order to analyze an intervention's outcomes and to refine the intervention (DBRC, 2003; Bell, 2004). This integration of multiple research methods results in multiple sources and sorts of data, which increase the objectivity, validity, credibility and applicability of the findings (Wang & Hannafin, 2005).

The design research process is an iterative process. It takes place through continuous and iterative cycles of design, enactment, analysis and redesign (Collins, 1990; Cobb, 2001; Bannan-Ritland, 2003; DBRC, 2003; Wang & Hannafin, 2005; Dede, 2004; 2005). It is thus flexible and adaptive to emerging developments in theory and practice (Edelson, 2002; Cobb et al., 2003). However, when changes are made in the design, they should be cross-checked with all other components of the design to make the necessary adjustments for design coherence and compatibility (Collins et al., 2004).

Research in Education is challenging. Constituents in an educational design research project like student participants, teachers, parents and administrators come with different needs, interests, abilities, interpretations, interactions and goals, which could easily steer the research being implemented into directions that could never be completely specified before-hand (Collins, 2004). However, the flexibility of Design Research lies in its adaptability to these different variables through subsequent cycles of design, implementation, analysis, and redesign.

The main problem in design research used in this research project is the problem of narrow measures (Collins, 2004). While it is relatively easy and healthy for design research in engineering or similar disciplines to isolate factors of influence and focus

on a few dependent variables, this narrow focus is actually a problem for design research in Education.

Educational systems and the corresponding design research often focus on content and skill delivery. When little or no attention is given to issues of motivation, commitment, and appreciation of the area being studied, the danger lies in producing expert test takers who earn high marks, but who hate the delivered material and the discipline it represents, all the while employers want graduates with commitment, timeliness, communication skills, and passion about the job (Stasz, 2001).

Design Research thus needs to push educational systems to offer environments where students are not afraid to present new ideas, share what they learn, and create an output they can show to the world. Any evaluation of learning environments outside this framework would lead to an emphasis on the wrong goals and will miss-guide system design and miss-judge system outcomes (Shepard, 2000).

Design research is in its early stages and is still evolving, and is criticized as a research method. Dede (2004) criticized the lack of standards to decide whether a design should be dropped or sustained. There are also methodological challenges that need to be addressed if Design Research is to be developed "from a loose set of methods into a rigorous methodology" (Kelly 2004, p116).

Other researchers indicate that Design Research is suitable for VW research which, like Design Research, is also a fairly young area of technology which is still evolving. Savin-Baden (2010) takes this stance describing this research approach as useful for SL as it combines both research and practice, and since is focuses on characteristics such as being pragmatic, interactive, flexible, integrative and contextual.

Design Research was adopted for this research study due to its features that suit this

type of research. Flexibility in researching a new area of learning is such a feature in Design Research. Experience built by running a research study allows for modifying subsequent studies in such a way that would better match the research context, and that would better adapt to the changing landscape of technology such as the VW medium being researched in this project.

3.2.3 Comparative Method

The present research project constitutes an evaluation of Virtual Worlds as a medium of learning delivery. In many fields of study it is hard to reproduce measured results exactly. In his book, 'The Design of Experiments' (1935) Ronald A. Fisher established the method of comparison between treatments as much more reproducible then experimenting with one treatment. This often takes place through comparing against a standard or traditional treatment that acts as baseline.

Comparing the VW medium with other learning media promised to be a suitable approach for its evaluation. This method was utilized in Study-1 and Study-2 through assessing the VW medium effectiveness in learning as compared to more traditional learning media, such as a VC class and a face-to-face classroom that acted as baselines for the purpose of comparison.

3.2.4 Media Comparison Studies

The usefulness of media comparison studies has, however, been challenged as un-reasonable. Clark (1983,1994) argues that media are analogous to grocery trucks that carry food but do not in themselves provide nourishment (i.e., instruction). It, therefore, makes little sense to compare delivery methods when instructional strategies are the variables that impact learning. In a parallel argument, Thomas Reeves argues that over fifty years of media comparison studies conducted by educational technologists to examine the influence of devices on educational achievement, had the most frequent result of 'no significant differences' (Reeves,

Herrington, & Oliver, 2004).

Counter arguments have been made by several authors such as Kozma (1994) that debated Clark's stance on media comparison studies. In a more recent study, Joy et al., (2000) reviews several media comparison studies, pointing to their flaws in several aspects that have led to no significant differences while comparing educational media.

One such flaw in media comparison studies reviewed was time to achieve the experimental task. Joy et al., (2000) argues that if you give participants all the time needed to achieve a certain task, the task would be achieved by every one of them leading to no significant differences across groups of participants. Researchers should thus adhere to time-tested instructional design strategies regardless of the medium under test. Other flaws in the studies reviewed included the group selection process, familiarity of participants with the media, and the instructional methods used. Joy et al., (2000) concluded that learning effectiveness is a function of effective pedagogical practices, and finding the right combination of instructional strategies and delivery media that will best produce the desired learning outcome for the intended audience.

The learner mood is a factor to consider in media comparison studies. If the learner is content while learning through a certain medium, the learner is likely to be motivated to use that medium again and again for learning. In a parallel argument, a learning process could be viewed as a set of methods – methods of delivery (media), methods of attention-holding and motivating, and methods of evaluation, etc. The examination of a certain intervention should take account of all methods working together as one whole. After-all, it might not be even suitable to separate the instructional method from the media delivery method (Warnick et. al, 2007).

If the result of 'no significant difference' is examined critically, it can be concluded that it is a result not to be taken lightly. When computer media can achieve what a

face-to-face encounter can achieve in learning, this by itself is a result significant enough to consider computer media for learning, especially in applications and scenarios where only computer media could serve learning.

Media comparison studies have their limitations, but they are still needed to evaluate new and existing media for learning. As computer and Internet penetration increased, and as applications matured, it became widely accepted that computers can support instructional methods that other media cannot support, and can provide learning opportunities for learning by means of their own nature and unique capabilities Chapter 2 gives a detailed account of the online language learning, VW learning along with extensive references to support computers in education.

There remains the task of evaluating how to optimally align instructional methods with computer media delivery methods in the service of an intended audience. This research is a media comparison study that strives to do just that, and it does it by comparing VW media classes to other media classes used for language learning, while utilizing certain instructional methods specific to VW like practice boards available 24/7 for individual study, and role-play areas which mimic real-world environments to some degree of realism.

3.2.5   Sampling and Validity

A number of factors influence sampling for an educational research project. The type of research at hand dictates the limits of sampling. Qualitative research methods, for example, typically involve smaller samples since they require rigour in assessing the various data types collected. Since the PhD research project used mixed-research methods, it was necessary to keep the number of students low in order to properly analyze qualitative data.

Another factor in determining a suitable sampling strategy is the nature of the

experimental research activities. A media comparison study involves running classes online. A typical online class has a certain limitation in the number of students for allowing effective student participation, and for preserving the instructor's ability to serve the class effectively. Hence small numbers of students work best for online synchronous discourse. Recommendations range from 6-8, to fewer than 15 (Murphy & Ciszewska-Carr 2007).

The limitations of the online media used also plays a factor in determining a suitable sample size. The VW SL has certain limitations in the number of objects (prims), as well as avatars co-located in one virtual space. One limitation is related to the processing load that SL servers are able to deliver in rendering real-time data and forwarding updated data of the 3-D locale to all participants' desktops. Another limitation is related to the metrics of the physics engine the VW is running and how closely co-located avatars are allowed to be. A third limitation is the metrics of the 3-D voice engine that dictates the practicality of holding closely co-located meetings in VWs. A fourth limitation is the desktop application interface and the screen size of a typical desktop. A fifth limitation is the high-level skill set required for teachers to be able to manage large synchronous VW class meetings.

Sampling is also limited to other practical considerations such as the number of participants that the researcher was able to recruit for a certain given study. Even after extensive recruitment campaigns through several media, and even after announcing paid compensation for Study-2, the largest number of participants in any of the Studies conducted throughout this research project was 30 students. The critical factor in such a case is the careful design and analysis while conducting the research project with the available sample, making the best out of the opportunity.

Validity of a Study is connected to the sample size. Due to the small number of participants in a given qualitative study, there is a problem in the generalization of its results to different contexts and on different subjects, limiting the transferability of

these results for broad application and wide adaptation. However, as the sample is taken randomly, there are fair chances that the sample is representative of a large population from which the sample was drawn.

Another source of concern for validity of a limited-sample qualitative research project is the errors in interpreting the data available through a given research tool such as attitude surveys. One research method to address this concern is triangulation between several research tools, creating multiple views of a fact, and wiping out any doubt of the validity of one research tool applied in solitude. Section 3.5.5 elaborates on this method after exposing the research tools used in the Studies.

Since a single researcher performed the study design, data collection and analysis, care was to be given so as not to subject the research to researcher bias, especially if the researcher comes with a pre-bias or a pre-supposition and goes on to design the project to prove a certain point. Another observer would limit the effects of such a tendency if it existed. This issue has been dealt with in a number of ways throughout the research project. Supervisors joined the research project while the experiments were running giving critical feedback. Further feedback from supervisors on research tools, Study design, as well as participant recruitment and allocation has been beneficial in putting the research agenda in a wider perspective. Study-2 assessments have been corrected by two reviewers to ensure consistent results.

Instead of researcher-bias, another kind of problem was witnessed in this research study. When the researcher set-out to prove his pre-meditated hypothesis that VWs offered great potential over traditional media for learning, he was disheartened to learn that the research results were not consistent with his pre-supposition. This has caused a delay for him to digest these results before setting out to report them.

3.2.6 Ethics and Informed Consent

Integrating a code of ethics into a research project is an important requirement to insure informed consent and voluntary participation, anonymity and confidentiality of participants, and accountability in terms of the accuracy of analysis and reporting. These requirements have been developed to protect the participants from any harm if they join a research project. For a language class within an educational research project, conducting ethically-compliant research was not a major issue. Such a project clearly involves no potential risks to human subjects. Nonetheless, conducting a research project needed to be in compliance with institutional and national codes of ethics.

For the sake of conducting the PhD research project, the research process needed to abide by ethical principles and guidelines for conducting research at the School of Education in the University of Nottingham, which is in accordance with the British Psychological Society Code of Conduct, Ethical Principles & Guidelines (2001) pages 9-14, section on Ethical Principles for Conducting Research with Human Participants. The research process was also to be in accordance with the Revised Ethical Guidelines for Educational Research (2004), pages 1-13, of the British Educational Research Association.

After the Main PhD supervisor made a detailed explanation of these requirements to the PhD researcher, and after the researcher read the ethical requirements, both the supervisor and the researcher signed an extended document of 22 statements titled 'School of Education - Statement of Research Ethics'. In compliance with applicable UK standards, the document required that all participants were over 16 years of age, were well aware of the Study and their right to withdraw at any time, and that their participation in the Study involved no risk to them.

The Pilot Study was conducted via videoconferencing with no direct contact between the PhD researcher and the participants. Therefore, the Supervisor made all necessary arrangements for meeting ethical requirements. During introductory sessions of Studies 1 & 2, students were well informed about the courses. They were all handed out the 'Information Sheet for Participants' (Appendix 6.3), and the 'Participant Consent Form' (Appendix 6.4) which they all read and signed. Participant safety and confidentiality were kept throughout the research process which ran in full compliance with the codes of ethics aforementioned.

3.3   Class Delivery Models

3.3.1   Overview of Models

In comparing the Virtual World (VW) media with other media for learning like face-to-face (f-to-f), or videoconferencing (VC), there are a number of possible models for class delivery. One such model is the parallel model, in which each group of language learners would take the class using a unique medium of instruction. Another model of class delivery is the sequential model, in which one group of participants would use all three media in sequence. A third model is the cross-over model, in which each of two groups of students would take lessons through one of two different media, and would then cross-over to take another set of lessons through the other medium.

The parallel model would involve two or more separate, yet similar groups of eight students, each taught with a different learning medium, requiring a minimum of 24 participants if the VW medium is to be compared to two other media. Using this model, learning outcomes are assessed by a final test common to all participants, giving insight into the effectiveness of each medium in delivering language education relative to the two other media.

Effort must be made to make sure the three parallel groups are indeed parallel in every

aspect, from student age, language aptitude, and motivation, to the rate of language content delivery and support facilities, irrespective of the technology or medium being used. More effort would be needed to deliver a small class to three groups, which is effectively equivalent to delivering three classes, with the associated technical and administrative overhead.

The Sequential Model is suited for one larger group of 12-15 students taught through a sequence of 'm' media with m! (m factorial) possible sequences. With m=3 media, we would have 3! = 3x2x1 = 6 possible sequences. One of these six possible sequences for example would be to deliver a VW class first, followed by a VC class, then by an f-to-f class. The large group size in this model is required to tolerate student dropout to a certain extent.

Even with a learning assessment performed after the delivery of classes through each medium, the sequential model is less indicative of the learning outcomes of each medium individually. This is because the second and third media learning outcomes would be affected by the learning outcomes of the media previously used. Interviews would however be more useful than those in the parallel model, as participants would have experienced all media, and would be able to reflect on the pros and cons of each medium relative to the other media.

The Cross-Over Model would involve two groups of students, taught by two different media. Groups would then switch media. This model would be feasible for a comparison between a face-to-face classroom and a VW classroom. Thus half the participants would be taught face-to-face first and then through the VW, while the other half would be taught though the VW first and then face-to-face. This model is useful for comparing the effectiveness of learning through one medium relative to the other medium and participants would be able to aid in the comparison process as they would be exposed to the two media being compared.

3.3.2   Comparison between Models

Each of the three models has advantages and disadvantages, either in terms of research outcomes, experimental complexity, or logistic requirements. Table 3.1 below outlines these advantages and disadvantages of these models.

Using the sequential model to compare the VW medium to two other media involves a number of participants taking classes in three phases, with few lessons delivered through a certain medium in every phase. This model is very beneficial in terms of its tolerance of participant dropout, and in terms of the feedback that could be generated by participants who would experience all three media. Another advantage for this model would be the ease of scheduling since each class would be delivered once and not two times as in the cross-over model or three times as in the parallel model.

Learning Model	Advantages	Disadvantages
Parallel Model	Choosing similar groups of participants would be necessary. Participant training on using VWs would be limited to the VW group. Final assessment results would be the most indicative as parallel groups are taught independently.	Involves the greatest number of sessions. Participant attendance is important and dropout poses a problem. Participants would not be able to aid the media comparison process.
Sequential Model	Student language aptitude distribution and group selection would be irrelevant and unnecessary. Small student dropout would not pose a major problem. More sessions would be possible in a given time frame. Easier class scheduling provides that a common time is available to all participants. Participant feedback would be more useful in comparing the media as they would be exposed to all of them.	Could only produce a vague vision of the learning effects that each medium contributed. Testing after each phase is required VW training would be required for all participants. In-class individual attention would be more difficult to offer to participants in the larger classes.
Cross-Over Model	Similar group selection would be straight-forward. Two groups of 8 to 12 participants each would be required and so student drop-outs would be less of an issue than having three groups. Participant feedback would be more useful in comparing the media as they experience both media under review.	Testing after each phase is required. Model would only be suitable for comparing two media at a time. More experimentally and logistically demanding. VW training would be required for all participants.

Table 3.1   Advantages and Disadvantages of three Class Delivery Models

3.3.3 Models Utilized

Larger classes would hinder the effective delivery of language lessons by limiting student interactivity, and the individual attention each student requires, thus limiting

understanding, efficient learning, and motivation, and leading to a large student dropout. Smaller classes would thus be more beneficial than larger ones. However, running a single small class would make a given study vulnerable to student dropouts. This is why the sequential model, which involves one group of students, has been ruled out for the purposes of this research project.

The two remaining models were both suitable for the Study. In the parallel model, participants would not be able to directly contribute to the comparison process since they would only experience one medium, but the medium learning outcomes would be the most independent compared to the other class-delivery models. Moreover, the parallel model allows the comparison of VW technology to more than one medium during a given study. For the advantages it could offer and for the sake of comparing VW media to two other media, the parallel model was chosen for Study-1 classes.

The cross-over model was useful for the comparison between two given media. It out-performs the parallel model in that it allows for participant feedback as they experience both media in a single study. But since students learn through both media, the medium learning outcomes would be somewhat interdependent. For this reason, an assessment after each learning intervention carried through a certain medium would be needed to accurately assess the learning outcomes of that medium. For the advantages it carries in comparing the VW medium to the f-to-f medium, the cross-over delivery model was used for Study-2 classes.

3.4   Research Methods and Tools Utilized

3.4.1   Design Methods

Based on the set of opportunities offered by VWs in language learning, a set of scenarios for designing the VW learning space has been developed. These included class seating arrangements, class learning tools like practice boards which allowed

access to learning material any time the student needed them, and VW role-play areas which were used during class delivery. Chapter 5 carries a detailed account of the design of the VW classes, rooted in learning opportunities offered by VWs like learning by communicating, interacting, experiencing, and immersion.

3.4.2   Attitude Surveys

Research has shown that collecting feedback of research participants through attitude surveys produces information that can be both valid and reliable (Hinton, 1993). Attitudes of participants toward learning through a new medium constitute an indication of their acceptance of this medium, how it served them well, and how it did not.

Attitude surveys have been extensively used as a method of qualitative research to collect information such as attitudes towards learning components, teaching strategies, usefulness of learning materials, organization, pacing, or workload. Such information would bring insight to an evaluation research project such as this project. The feedback from attitude surveys would increase the understanding of how learning took place through the VW medium, and inform better ways of design.

Popham (1999) offers information on how to design, administer, and interpret an attitude survey. A typical method for the development of such a survey follows. The affective variable to be assessed is first determined. Then a series of favourable and unfavourable statements are developed regarding the affective variable. Several people would need to classify each statement as positive or negative. A decision would then need to be made on the number of response options for each statement. Ranking scales (often referred to as Likert scales) are very common on surveys. When the statement is presented, the student can respond on a scale that indicates how much (or little) they agree with the statement. A self-report inventory is then prepared, giving students directions on how to respond. The survey should then be administered

as a pilot if possible, and scored to identify and eliminate statements that fail to function in accord with the other statements.

Attitude surveys can be administered prior to the study (pre-study) and after the study (post-study). In the pre-study survey, personal data like age, gender, college major, language learning background, etc. would be collected in order to inform the allocation of participants across experimental groups, and in order to make correlations between participant backgrounds and research results, to better understand and explain the results. Post-study surveys would be used to capture the participants' reaction to the research methods and the effectiveness of each medium. These surveys could also be cross checked with pre-study surveys to assess changes in participant attitudes after taking classes.

Attitude surveys have limitations. For one, it is difficult to confirm that participants took time to understand the statements in order to respond correctly, or whether they have been truthful in their responses. This could be an issue in certain situations, like when participants are afraid their responses would not be polite or would hurt the feelings of whoever is reviewing the surveys. Dealing however with mature participants such as college students would diminish the effects of such a limitation.

Another limitation is that attitude surveys are assessments of participant attitudes towards an educational intervention, and not of the learning processes or the learning outcomes that resulted. They thus have a limited role in educational evaluation.

3.4.3 Assessment of Learning Outcomes

Assessment of learning outcomes is a quantitative research method which offers a numerical representation of learning experiences. It constitutes a useful indication of how participants taking lessons through a certain medium performed, and this in turn would indicate the extent of learning success through that medium.

A valid assessment is one which measures what it is intended to measure. A writing assessment cannot evaluate language pronunciation skills for example. Assessments were conducted for Studies 1 and 2, and were divided to three parts, a part for assessing vocabulary retention, another for sentence structure and ability to use the acquired language skills, and third part was to assess pronunciation skills acquired. The first two parts were written and the last part was oral.

Assessments of learning outcomes were conducted at certain points during the research study depending on the class delivery model used. For Study-1 that used the parallel class-delivery model, a summative final class assessment was conducted that gave an indication as to the learning outcomes achieved by each of the three groups, reflecting on the success of the learning interventions through corresponding media used by these groups. As for the cross-over model, assessments were required after each medium intervention to assess individual medium learning outcomes and to eliminate any media learning interdependencies, so as to fairly assess the learning outcomes of a certain medium in isolation of the other media used.

As general criteria for scoring and interpreting assessments, reliability of scoring assessments can be achieved when two independent reviewers are able to rate the same assessment and acquire similar results. Consistency in scoring assessments could be insured when a given reviewer is able to acquire consistent scores across time (Moskal et al., 2000). Both of these criteria have been met for the first two sections of Study-2 assessments, since section three of the assessment involving pronunciation was conducted during the time of the Study when no other Arabic language reviewers were available for observing the assessments. Reliability was insured through another reviewer who scored Study-2 assessments and achieved close results. The researcher also re-rated the assessments and acquired similar results.

3.4.4   Interviews

Interviews are an integral part of modern qualitative research. Social scientists began using interviews around the turn of the 20th century to gather information about groups or classes of people and their beliefs and attitudes about a variety of issues. Group interviews became popular after World War II and were called focus groups (Frankel et al., 2000). In conducting interviews with individuals, the researcher may be able to obtain more detailed information for each participant, but loses the richness that can arise from a focus group in which issues are debated and views are exchanged.

Interviews could be conducted by asking a set of predetermined questions, as would be the case in quantitative surveys. Leaving room for flexibility however in following the lead of respondents as they answer interview questions would encourage them to express their views at length, and would lead to the right kind of questions to ask. Probing participant feedback could also be achieved through open-ended questions.

An interviewing technique that focuses on events is called the critical incident interview, in which subjects are asked to comment on specific events rather than giving generalizations. This could reveal more about beliefs, attitudes and behaviour as it would be more rooted in experience. Unstructured interviewing could be used where there is a lack of adequate theory and definitions in a certain complex field to produce well defined survey techniques (Frederikson et al, 1996).

3.4.5   Video Recordings

Video recordings were kept of all classes that were delivered in Study-1 and Study-2. For the f-to-f classes, videos included the view of the instructor, another for the students, and a third screen shot of the interactive white board that was used in presenting the material. For the VC classes, video feeds of the students, the instructor, and also the tablet computer on which the instructor projected class notes and wrote

comments. For the VW classes, two feeds from two student locations, one feed from one student's screen and one feed from the instructor's screen were mixed on one video screen for later analysis.

3.4.6   Critical Incident Method

The critical incident method has been described in a classic article in 1954 by Flanagan (Flanagan, 1954), and has since then been extensively used as a qualitative research method (Butterfield et al., 2005). A critical incident is: "… a story with a climax, dilemma or issue to be addressed, but no clear resolution and when the incident is finished being told, there is still a need to ascribe some meaning to the incident before it can be resolved in the mind of the teller" (Fitzgerald 2001, p151). A critical incident could either be a breakthrough (the climax), or a breakdown (the dilemma).

Breakthroughs are observable critical incidents which appear to be initiating productive new forms of learning or important conceptual change (Sharples, 1993). For example, breakthroughs take place where there is some activity or discussion captured on the video that indicates a cause or a solution to a learning problem or that suggests an activity that contributed to learning.

Breakdowns are observable incidents where a learner is struggling with the technology, is asking for help, or appears to be labouring under a clear misunderstanding. Breakdowns could be related to a technical failure, or a learning activity failure like when the participant does not understand the task at hand, or they could be activity-related such as language misunderstanding. Incidents may either be predictable, for example where the intervention may be aimed at producing conceptual change, or unpredicted, where a participant uses the technology in novel ways, or makes an unforeseen connection or conceptual leap.

The critical incident analysis starts with a thematic analysis described by Boyatzis (1998). Another method called content analysis is considered to be very similar to thematic approaches. It is a method that can be used to identify patterns across qualitative data. Content analysis provides frequency counts of certain incidents, and helps in transforming qualitative data into quantitative data (Ryan et al., 2000). The difference between thematic analysis and content analysis is subtle since themes sometimes tend to be quantified.

The thematic analysis is done through identifying a set of incidents from the video/screen capture archives, then transcripts of the critical incidents during dialogue and class interactions are generated, coded and analyzed to infer sequences and themes of repeated incidents, whether they be breakthroughs or breakdowns, their potential causes, the problems behind breakdowns, and their possible repairs.

3.4.7   Summary of Research Methods and Tools

Design methods built on the literature survey to assemble a set of design requirements for the VW learning space. These design requirements are used to build the VW learning space. They are later analyzed by research tools described earlier, and the results of the analysis are discussed in chapter 8. The research tools span attitude surveys, interviews, assessment results, and the critical incident technique applied to recorded class videos. Triangulation of results from different perspectives allow for a well-rounded view of what each learning medium offered to the learning process.

3.5   Data Collection and Analysis

This section explains how qualitative data were collected and analysed for the Pilot Study and for Studies 1 and 2.

3.5.1   Attitude Surveys

Attitude surveys were used for all the studies in this research project. Pre-attitude

survey statements were chosen to assess the participants' background, their attitude and exposure to languages and different media for learning languages. Post attitude surveys were used to assess the attitudes developed after the class interventions towards language learning, the learning environment, and the methods and media used. Open-ended questions were used in both pre- and post-attitude surveys to be able to give respondents the ability to share any useful information. Some statements ended with questions like 'why', or 'why not' in order to solicit participant feedback.

3.5.2   Interviews

Individual interviews were used in all three Studies conducted with participants as part of this research project. Interviews were conducted during the final session when learning interventions were over. These interviews were informal and un-structured in nature and were aimed at soliciting feedback from participants that slipped past the post-attitude surveys. Interview results were documented for each study in the results section of the respective study.

Flexibility in following the participant lead, and open-ended questions were applied and utilized during interviews conducted after the research studies. A set of interview questions was prepared for each study but was loosely followed. As students answered, their responses took the discussions in different directions extracting more knowledge from their experiences, and allowing their ideas to flow during the discussions. Open-ended questions were utilized to give participants the chance to express their views in a precise way, rather than being captured within a certain pattern of interview questions.

3.5.3   Critical Incident Method Data Collection

The critical incident method was not applied for the Pilot Study since the classes were not video recorded. The method was applied to Study-1 and Study-2 where VW classes were recorded and reviewed. During the review, a set of incidents were

documented, with one file per incident (See Appendix 6.11). After transcripts of different incidents in a certain recorded intervention were logged and documented, they were analysed using thematic analysis (Boyatizis, 1998). The incidents were first categorized according to the nature of the incident, either as a breakdown or a breakthrough. Each incident under each category was then listed under a certain type, such as technical incident, usage related incident, activity related incident, learning activity related incident, motivational, incident, etc.

Contextual factors of a certain incident were deduced by examining the preceding and following activity. Incident transcripts were then analyzed to examine whether there are commonalities between them that form an obvious recurring pattern. Patterns of breakthroughs clearly identified how a certain learning medium supported learning, while patterns of breakdowns showed how the medium failed in achieving its learning goals.

The analysis led to a conclusion as to the nature of affordances of the VW medium under investigation. In both cases of breakdowns and breakthroughs, educational design implications were drawn. Results of the critical incident method data collection and analysis are included in the results sections of the respective Studies, section 6.5.8 for Study 1, and section 7.4.5 for Study 2.

3.5.4   Following is a table that illustrates data collection across the whole study (number of interviews, participants . . .)

Data/Study	Pilot Study	Study 1	Study 2	Comments
Number of Participants At the Start of the Study	30	30	22	
Number of Participants At the End of the Study	11	10	22	
Number of Interviews	Group Interview	10	22	
Number of Pre-Attitude Surveys Filled	None	24	22	
Number of Post-Attitude Surveys Filled	None	10	19	
Number of Classes taken	8	9	5	Including orientation sessions.
Number of Incidents Analyzed	None	50	50	
Number of Assessments Conducted	None	10	22	

Table 3.2   Data Collection Summary

3.5.5   Triangulation of Research Data

Just as using different perspectives of a building allows better understanding of its shape, using different research methods and tools allows for different perspective of analysis of the research outcomes. Altrichter et al. (2008) argued that triangulation:

"gives a more detailed and balanced picture of the situation".

What one method fails to capture, another method captures. What was hidden throughout using one class-delivery method was exposed while using another class-delivery method, for example. What one tool, such as surveys, failed to capture is clearly shown through other research tools such as informal interviews, and what both

surveys and interviews failed to capture was visible through a critical analysis of recorded class videos.

This process of triangulation allows for a multi-dimensional view of research data and hence a better interpretation of results. There are several types of triangulation. The type used in this research project is called methodological triangulation that involves employing several methods to gather data, such as interviews, observations, questionnaires, and documents.

According to Bogdan et. Al, (2006), triangulation can be employed in both quantitative (validation) and qualitative (inquiry) studies. He states that:

- *It can be employed in both quantitative and qualitative studies.*
- *It is a method-appropriate strategy of founding the credibility of qualitative analyses.*
- *It becomes an alternative to traditional criteria like reliability and validity.*
- *It is the preferred line in the social sciences.*

Bogdan et. al, (2006) adds that the combination of multiple observers, methods, theories, and empirical materials allows researchers to overcome the problems that arise from single-theory, single method, and single-observer studies.

3.6   Chapter Summary

This chapter outlined the methodological framework for running this research study. It started with a broad introduction to the need for both qualitative and quantitative research methods, outlining the issues to consider in either approach. Design research was described as well suited for the nature of the research being conducted due to its iterative nature through modifications to subsequent studies, and its flexibility in integrating qualitative and quantitative research tools, which allows objectivity,

validity, credibility and applicability of the research findings.

The comparative method was then introduced as a valid research method that has been used for decades. A discussion of the various positions on media comparison studies was then presented, followed by the researcher's critical stance in favour of such studies. Issues of sampling and validity were then presented, followed by ethics and informed consent requirements for running a research project. The different class delivery methods were then outlined with both their advantages and disadvantages. Suitable class delivery methods that included the parallel model and the cross-over model were recommended for the studies.

The chapter then presented different research methods and tools employed, including attitude surveys, class assessments, interviews, video recordings, and the critical incident technique, followed by a discussion of how these tools were utilized for data collection during the research Studies and a table that summarizes that data collection process across the entire research project.

The chapter concluded with introducing the concept of triangulation which cross-checks and complements different components of the research data collected, and makes it fairly straightforward to conclude that the approach used is valid and consistent with the scientific research methods in general and with those methods utilized in the learning sciences more specifically.

Chapter 4

Pilot Study

4.1   Introduction

4.1.1   Background

Towards achieving a better understanding of the dynamics of language learning in Virtual Worlds, several preliminary steps were necessary. Although by the year 2007 this researcher had over a decade of teaching experience, he had no prior language teaching experience. Moreover, delivering classes to a foreign audience was like sailing into uncharted waters.

Several issues needed exploration, like the opportunities and restrictions posed by technology, and the openness of UK-based students to sit for a cross-national language class and their attitudes to the subject, its delivery method(s), and the media used. A study was thus needed to shed light on these issues, setting the stage for a more specific and detailed study while exploring whether further research studies could be conducted remotely or needed to be based in the UK.

4.1.2   Overview

In Early 2007, the PhD research supervisor made contact with the head of the school of politics at the University of Nottingham for the purpose of recruiting post-graduate students to sit for Arabic Language classes. Between March and June 2007, six classes were delivered from the University of Balamand in North Lebanon via videoconferencing. Student pre- and post-attitude surveys were conducted, informal discussions were held, and reflections were made based on the overall experience.

Only ten out of the 24 participants originally recruited attended three or more of the six sessions delivered during the Pilot Study. However, valuable language teaching

experience was built by the researcher, and important information was collected on technology limitations as well as the dynamics of UK student motivation and retention, informing the research design and driving the decision as to where and how to carry out the research studies to follow.

4.1.3   Pilot Study Objectives

Based on experience built through student recruitment, student retention, language class delivery, and the use of data captured by research tools like attitude surveys, the Pilot Study had the following objectives:

- o To investigate willingness of UK-based students to participate in cross-national language learning activities and documenting their attitudes.
- o To build the researcher's language teaching experience.
- o To explore the medium of videoconferencing, and develop a feel for the opportunities it offers as a class delivery medium, for students to understand and use the spoken language through engaging students with the teacher.
- o To explore the challenges created by Videoconferencing as a medium for teaching. The Pilot Study would allow for discovering the shortcomings and technical challenges facing this medium, thus allowing for a finer adjustment of the research studies to follow.
- o To provide a base for comparing the medium with other media, allowing for a better informed comparative analysis between learning media in later studies.
- o To set the stage for the PhD studies. The Pilot Study constitutes a test run for studies to follow, setting the stage for different elements of the studies, and preparing the researcher for the next level.

4.2 Pilot Study Description

4.2.1 Student Background

The main PhD project Supervisor Professor Mike Sharples made contact with the Head of the School of Politics at the University of Nottingham to advertise a complementary Lebanese-Arabic language class to students, and early in the Spring 2007 semester, 24 post-graduate students from the School of Politics showed interest to sit for the Arabic Language classes.

One student was studying at BSc level. 22 students were post-graduate, studying at MSc level, and one student was a PhD holder. Most of them were close in age, between 20 and 29 years old. There were 13 male participants and 11 female participants. Most of the participants had no prior exposure to the Arabic language. Only three of them knew a few words of Arabic.

4.2.2 Language Taught

The choice of language to be taught was important. Arabic was new to UK students so it was attractive for them to learn, especially those students studying Politics as they tend to need foreign languages for their future careers. Moreover, Lebanese Arabic is understood by most of the 300 million Arabs and thus very useful to learn. On the other hand, the researcher was a native speaker of Lebanese Arabic, positioning him to deliver the classes.

4.2.3 The Classes

As postgraduates at the University of Nottingham, it was assumed that the students had a good command of English. It was considered safe to use English as the language of instruction for the Arabic language class. During the course introductory session students were informed about the course, and were handed out the Participant Information Sheet and Consent Form (Appendix 4.1) which they all read and signed.

Six classes were conducted between March and June 2007. The one-hour language classes covered only spoken language, as writing in the Arabic language required a long time to learn and was outside the time scope of the Pilot Study and the research project in general. Pilot Study classes could only cover the spoken language basics, and even with the basics, one had to be selective. In developing the lesson plans, a few booklets that teach Lebanese Arabic were examined, all of which were comprehensive in their approach to language teaching. Internet research was then conducted to find suitable content for the Lebanese Arabic Language classes. Once a website was chosen and retrieved in 2006 (http://welcome.to/lebanese), the lesson material was developed around the themes found, and other themes were later added.

The lessons aimed at delivering basic knowledge and skills in utilizing the Arabic language as spoken in Lebanon. An overview of Arabic language spoken dialects and population distribution were delivered, and basic greetings and introductions were delivered during the first lesson. Classes then covered basic language knowledge, such as numbers, days of the week and months of the year, and also practical scenarios like introducing oneself at the airport, getting to meet someone, communicating with a taxi driver, a hotel receptionist, a restaurant waiter, and a Lebanese host. A sample lesson plan is included as appendix 4.2.

Basic grammatical concepts were covered, as well as basic Arabic language parameters including vowels and consonants. Students were taught how to pronounce Lebanese words and sentences and use them in a dialogue. A sample class handout titled 'Lebanese Arabic Language Lesson 4' is included (Appendix 4.2).

After introducing the lesson, the instructor read the activity at hand slowly to allow students to listen to pronunciation and to learn vocabulary. The instructor then gave illustrations through practicing with several students, one at a time. The instructor

then asked students to practice a certain activity in pairs. After an activity like basic introductions was covered, the instructor moved to another activity and covered it in a similar fashion. Each lesson covered three activities.

In later lessons, activities included constructing Arabic sentences using sentence fragments, and translating English sentences into Arabic and vice versa. Role-play activities took place towards the end of the course where each student was assigned a role and conversations were carried among students and with the instructor based on the roles assumed. It was originally planned that the final class session would involve a group of native speakers of Lebanese Arabic, giving the students an opportunity to practice what they learned in a group setting, but towards the end of the course, the idea was not practical for several reasons and was dropped.

4.2.4   The Instructors

As the researcher is also an academic with the University of Balamand, a leading University in his home country Lebanon, the Pilot Study classes were offered from Lebanon to University of Nottingham students through Videoconferencing (VC). The instructor was based at the University of Balamand in North Lebanon, and the students at the Learning Sciences Research Institute at the University of Nottingham Jubilee campus, Nottingham, UK. The first two classes were offered by Dr. Talal Wehbe, Assistant Professor of Applied Linguistics at the University of Balamand who had language teaching experience. The four remaining classes were delivered by the researcher Riad Saba, Assistant Professor of Electrical Engineering at the University of Balamand.

4.2.5   The Medium

The classroom-based videoconferencing medium utilized video and audio equipment (codecs) available on both sides. The Internet was used to connect the codecs in both campuses to deliver the classes. Video Conferencing (VC) tests took place well before

the classes started, and work was done to resolve problems with University of Balamand Internet links and issues with the software codec used which was affecting the quality of the Video conferences between Balamand, Lebanon and Nottingham, UK. Videoconferencing (VC) was suitable as a class delivery medium because it allowed students to understand and use the spoken language through near-direct engagement with the teacher. Broadband videoconferencing was well suited for one-to-many, one-to-one, one-to-some, and some-to-some communications (Smyth, 2005).

The researcher had taken a Marketing class in 1993 with satellite video links connecting three remote sites to the main site where the instructor was delivering lectures and responding to student questions. Also, previous conferences and classes were conducted between University of Balamand campuses in Lebanon with acceptable results. VC classes can be conducted from a classroom or lecture hall with which the teacher is familiar, enabling him/her to use familiar resources, and providing the students with near-classroom-like experience, thus posing minimal barriers to the teaching and learning processes.

The instructors were based at the University of Balamand Distance Learning Centre, which is housed in a 12m x 7m classroom, equipped as a board room VC suite, and supported by a control room and a UPS/Server room. The room design is shown below.
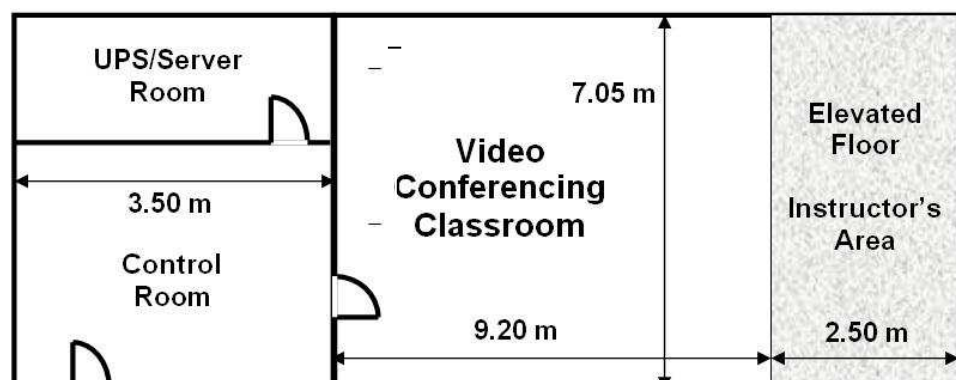
Figure 4.1   Distance Learning Centre at the University of Balamand (UOB)

There were three cameras situated in the back, the middle and the front of the room, and there was a large 42 inch TV screen in the front. The room had a ceiling-mounted projector at the front-centre, and student stations were facing the instructor's station, which was situated on the elevated floor. The video conferencing system was placed in the control room, and was later moved to the back-corner of the classroom for practicality. The room was fitted with two omni-directional microphones with large extension cables to be placed wherever needed around the room.
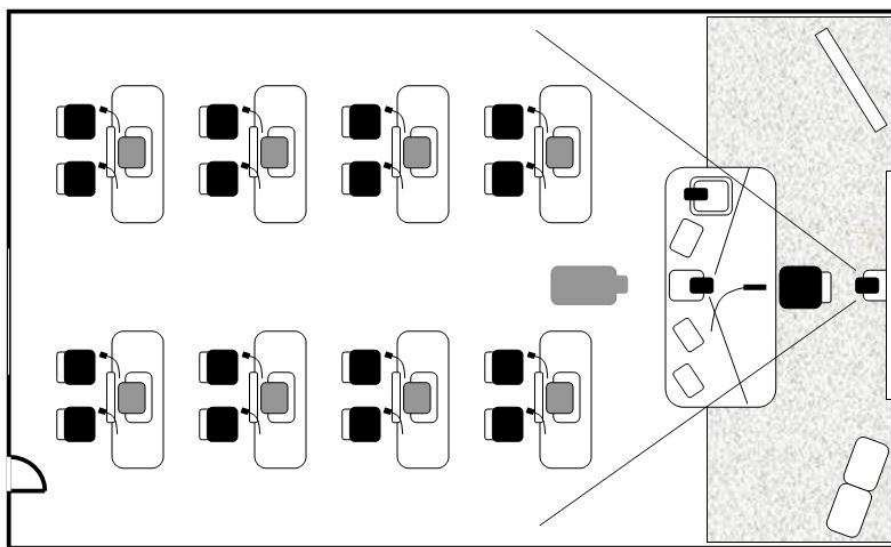
Figure 4.2   Room Layout at the UOB Distance Learning Centre

The students were based at the LSRI Flexible Learning Room (see figures 4.3 and 4.4), a 10m x 5m facility equipped with two interactive whiteboards with back-screen projection in front of the students, and a third screen behind, and four cameras to capture visual data as well as six microphones to collect sound from around the room. The small tables are re-configurable to any type of class activity.

Figure 4.3   Flexible Learning Room at LSRI Labs

Some of the VC classes were held at the Usability lab. The students sit around the table looking at the camera between the two screens in the middle, and the instructor video would be displayed on the large screen at the centre of the room (see figure 4.5).

VC however has limitations in terms of the modes of in-class engagement. As interactivity is limited to verbal and visual modes, the instructor cannot walk between students and support them close-by. Neither can a student present their work in front of a class without a camera operator equipped with the required functionality. In VC, certain parts of non-verbal communication are lost. Slight nods or eye twinkles, or even hand movements are sometimes not transmitted electronically because of image compression. Also students are not aware where the instructor is looking, even if the instructor is directly looking at them through the camera. The instructor could be only looking at the camera and not even seeing the students on the other end. This problem is also true in the reverse direction.

A field of view restricted by the camera angle limits the perception of users of remote sites. The depth perception is also limited in a VC environment because of the single video feed projection. Video carries little information about the three-dimensional

structure of remote sites, limiting exploration, inspection, and peripheral awareness (Gaver,1992).

The determination of where sound originated is also restricted for remote users. In physical settings, sound reaches us from every direction, and using our two ears we can locate sound sources easily. In a VC environment however, a single microphone is used to capture remote sounds at any point in time, and to add to the problem, microphone locations are not known by remote participants. This limits the audio localization awareness of the VC participant, and hinders the ability of the listener to discriminate between a desired conversation and external noise, as all the audio is mixed unto a single stream. When we talk to someone in a crowd, we focus on a single audio stream and reject other audio inputs around us. In a VC environment, this is simply not possible as we only have a single audio stream to focus on (Gaver, 1992).

As the instructor was based in Lebanon, there was a need for administrative support on both sides of the link. Student recruitment, printing handouts, passing and collecting consent forms, attitude surveys, and class handouts are examples of administrative support functions carried by LSRI staff. Technical support was also needed. Video and audio delays due to coding and transmission could pose problems in class delivery, such as video and audio freezing, which would affect the quality of class delivery. During testing, it was obvious that the VC link was not very reliable, and suffered several problems like video freezing, even disconnections. However, since VC systems were readily available on both campuses and the interconnection was possible through the Internet, and since there was no other delivery medium with affordable quality, VC was the de-facto medium used to deliver the classes.

4.2.6   The Study

VC allowed for the remote delivery of classes while the researcher was based in his

home country Lebanon. Student attitudes were evaluated through pre- and post-assessment surveys to measure learner expectations and reflections on the course. Class notes (Class 3 notes - Appendix 4.3) documented after each session by the researcher included session minutes, and the incidents observed which were categorized as either breakdowns in the language learning process or in learner motivation and interest, or breakthroughs which the medium facilitated during the learning process. Section 4.4 covers the issues faced in detail.

Informal group discussions were conducted at the end of specific classes with all attending students to get student feedback on the learning process so as to further drive the Pilot Study towards a successful completion. The main PhD Supervisor Professor Mike Sharples held an informal discussion with students after the first session. The researcher conducted similar discussions with students at the end of the third class, and after the sixth class which was the last class delivered. Section 4.5 details the results of informal class discussion results.
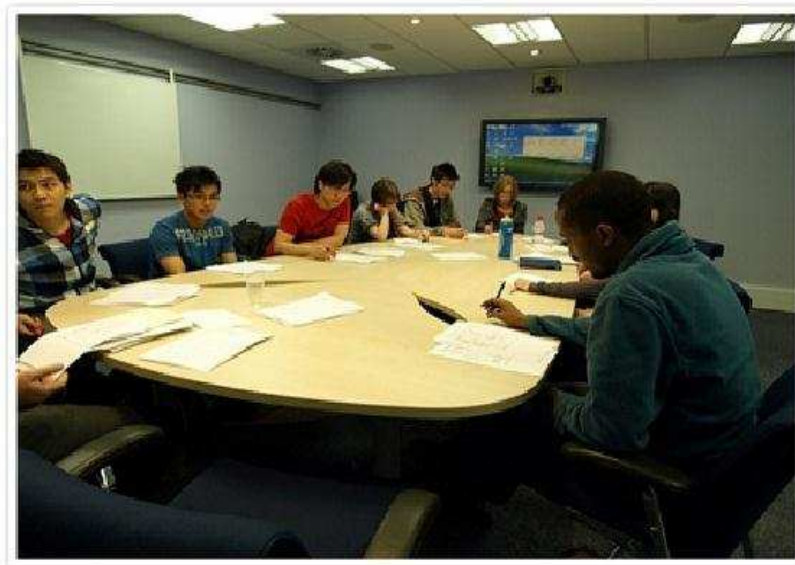
Figure 4.4   Flexible Learning Room where some of the classes were held

Figure 4.5   The Usability lab where some of the VC classes have been held. The students sit around the table looking at the camera between the two screens in the middle, and the instructor video would be displayed on the large screen at the centre of the room.

4.3   Pre-Study Attitude Survey Results

4.3.1   Introduction

Attitude surveys were described in chapter 3 as useful research tools that have been extensively used for collecting research data. After reviewing several attitude surveys recommended formats and actual surveys conducted, no survey was found to match the exact research requirements for data collection. It was thus necessary to prepare a custom survey that collected the data sought after for the research project. A pre-study attitude survey was prepared to collect participant background information, to assess participant attitudes towards language learning and the medium used, and to assess the students' expectations of the course before classes started in order to compare their attitudes before and after the Study.

The survey started with an introduction that outlined the Pilot Study goals and scope

and informed the students of their rights as participants in a research project. The survey contained 32 questions in three parts: student personal information, student attitudes towards language education, and student attitudes towards education media. The personal information section consisted of nine questions, five closed and four open. The remaining 24 closed statements were to be commented as per the following scale:

- o Strongly Agree
- o Agree
- o Not sure
- o Disagree
- o Strongly Disagree

Students were also given a space for open comment on each statement. The survey was completed by all students during the first class session. The pre-study attitude survey results are documented as Appendix 4.4. The following facts were gathered about the background and attitudes of students taking the Arabic language course.

4.3.2   Participant Information

All 24 students who filled the survey were from the school of Politics at the University of Nottingham. 23 out of 24 students were in the 20-29 age bracket, and 22 out of 24 were at the same graduate study level (MSc) with the exception of one BSc student and one PhD holder, apparently a School of Politics faculty or staff member since her email address followed the convention firstname.lastname@ nottingham.ac.uk. At the start of the Pilot Study there were 13 males and 11 females.

Half of the students (12/24) had English as their first language, four had German for a first language, and three had French, one Russian, one Uzbek, one Turkish, one Vietnamese, and one Indonesian. Seven of the twelve native English speakers reported no lengthy exposure to any other language. Regarding the question on the

Arabic language background, 21 Students had no prior exposure to the Arabic language, while three of them knew only a few words and phrases, possibly because of their Islamic background since the Islamic book Quran is exclusively taught in Arabic. If this assumption is true, then they could be non-practicing Muslims, which is common around the Muslim world, and this would explain why they only knew few words of Arabic.

4.3.3   Attitudes toward Language Learning

The statements in this section have to do with participant opinions about language learning and its importance. To what extent do you agree or disagree with each of the following statements about language Learning? (*Circle one attitude for each statement.*)

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree	Comments
1. Learning a foreign language should be a college requirement.	12	5	3	4		- Depend on the program type. - learning a foreign language should start in schools.
2. There is no need for me to learn another language.				6	18	
3. I have never considered learning another language before.	1		1	5	17	
4. Learning another language is too hard.		3	5	9	7	- It depends on personal qualities and talents.
5. Learning another language would help my English.	3	4	8	3	6	
6. A second language is part of an educated person's make-up.	7	10	5	2		
7. Another language can help me think and analyze better.	12	8	4			
8. Learning another language enhances my religious experience.	1	5	8	2	8	One Student commented that he is not religious
9. Learning another language will help me understand its culture better.	14	10				
10. I need to learn a foreign language to enhance my prospects for a future career.	11	11	2			
11. I do not like to travel abroad and hence I do not need another language.				6	18	
12. Any business today has to think globally, hence a second language is necessary.	10	11	3			
13. Another language would allow me to meet more girls/guys	3	10	7	3	1	- It could help avoid meeting new people in some undesirable circumstances.
14. I only need to learn a few basic words and phrases of another language		1	4	13	6	
15. Overall I think it is very important to speak another language	15	7	2			

Table 4.1   Pre-Pilot Study Attitude Survey – Section II

Seventeen students agreed or strongly agreed that learning a foreign language should be a college requirement, three were neutral, and four disagreed. All students indicated that they need to learn another language. This showed that students were convinced of the importance of learning a foreign language. Two students commented that it should be a school requirement.

Three students agreed, five were neutral, and 16 students either disagreed or strongly disagreed with the statement that 'learning another language is too hard'. Two thirds of the students were not too challenged by learning a new language. This response could be attributed to the group's high educational level and their diverse international and cultural backgrounds. Seven students agreed, eight were neutral, and nine disagreed with the statement that learning another language would help their English. The relevance was not obvious to students. Seventeen out of 24 students agreed on the importance of learning a new language in a person's education build-up, five were neutral, and two disagreed.

Most students (20/24) agreed on statement 7, which says that language learning is brain stimulating, and helps them think and analyze in a better way. Four were neutral on this statement. The class was divided in response to the statement 8, 'Learning a new language enhances my religious experience'. Six were in agreement. Eight were neutral, one of which commented that he was not religious, and ten disagreed.

The students unanimously agreed that learning a new language helps better understand the culture where it is spoken. Twenty two out of 24 students had a special interest in learning a foreign language as a means to advance their careers in the area of international relations and other branches of politics, while two were neutral. In response to the next statement, all students believed they needed another language as they travelled abroad. On statement 12, all students understood the global role language plays on the international business scene. This seems to be a globally-aware

group.

The class was divided on the social implications of learning a new language. Thirteen agreed, seven were neutral, and four disagreed that learning another language allows them to meet new friends from the opposite sex. One female student said that acquiring a new language could help avoid meeting new people in some undesirable circumstances.

Nineteen students disagreed or strongly disagreed, four were neutral, and one agreed that they only needed to learn a few basic words and phrases of another language. Most of the students believed in the importance of mastering a language and seemed to want more than getting their way around using a foreign language. Twenty two students agreed or strongly agreed and two were neutral to the importance of speaking another language. The general class attitude is that of favour to learning a foreign language due to its importance on multiple fronts.

4.3.4   Attitudes toward Educational Media

To what extent do you agree or disagree with each of the following statements about Educational Technology? (*Circle one attitude for each statement.)*

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree	Comments
1. I have not taken classes through large-screen video conferencing before.	15	6	1	1	1	
2. I have used Desktop video conferencing, like web cams, before	4	6	1	7	6	
3. It will be harder to learn a language by videoconference than with a traditional classroom.		7	14	3		One student taught French in Japan through videoconferencing. Another commented that the degree of difficulty will be dependent on how well technology is advanced.
4. I am not comfortable working with educational technology like e-learning.		2	12	4	6	
5. I need more effective tools for learning a new language since the traditional classroom is not effective.	3	8	9	2	2	
6. I have used computer technology to learn a new language in the past.	2	8	1	8	5	
7. I am excited about the technology-based Arabic learning class.	12	11	1			
8. I am not confident of my ability to learn a new language through technology		3	9	10	2	

Table 4.2   Pre-Pilot Study Attitude Survey – Section III

Almost all students (21/24) have not taken classes through large-screen videoconferencing before, but ten out of 24 have had previous experience with desktop videoconferencing. This would certainly help these ten cope with the VC class as they are familiar with the quality of service and delay issues associated. The remaining 14 students would have to adapt to this type of activity. Seven students responded that VC would be harder and three said it would be easier than a traditional

classroom, while 14 were neutral as they had no previous experience. When students were asked about their comfort with e-learning, ten out of 24 students reported that they were comfortable, two respondents were uncomfortable, and half the class was neutral on the matter.

Eleven students agreed, nine were neutral, and four disagreed that they needed more effective tools for learning a new language since the traditional classroom was not effective. The group who agreed was open to new media of language learning. The group who disagreed was committed to the traditional classroom. The neutral group preferred to wait and see. Ten students indicated that they have used computer technology to learn a new language in the past, one was neutral, and 13 have not used technology for language learning before. The student split-up process into two or more course sections could use this response as one of the criteria for allocating students across groups, depending on the research method and class-delivery model(s) of choice.

Twenty three students indicated that they were excited about the technology-based Arabic learning class. The majority of the students were enthusiastic to sit for the course. The positive class attitude is elaborated on under the 'Cultural Issues' section later. Half the class (12/24) indicated that they were confident of their ability to learn a new language through technology. Not all the class was certain however. Nine of them were neutral on the matter, and three were sceptical.

4.3.5   Survey Summary

The student background is considered suitable for the research. They are similar in age and have a near-even gender distribution, they are at a similar educational level, and come with high interests in taking the course, their English language ability is appropriate and they all start on equal foot when it comes to Lebanese Arabic.

They have taken no classes before through large-screen VC, and some have experienced desktop VC, but almost all are open to new technologies for learning. All of these factors make the students a receptive sample of participants who made no pre-judgments based on similar previous learning experiences, and who are motivated to sit for the course.

4.4 Issues faced

In the course of setting up the Pilot Study, many factors were promising, including the student enthusiasm and the effectiveness exhibited or promised by VC. The Lebanese Arabic language class was delivered in 6 sessions between March and June 2007.

Troubleshooting and optimization work was performed immediately after the class started. Several problems were evident and resolved with the means available. However, several types of challenges and issues were faced or anticipated. These challenges and issues were documented in the course of the Pilot Study. They were later classified into 6 categories according to the nature of the challenge or issue faced:

- o Geopolitical issues
- o Technical issues
- o Student Learning Issues
- o Organizational issues
- o Cultural issues
- o Student retention issue

4.4.1 Geopolitical Issues

The Lebanese suffer from Internet link 'starvation'. Since the Internet is the main readily-available medium for conducting this type of long-distance research, several issues involved Internet links. With a complete monopoly over the Lebanese Telecom sector, the Lebanese government charges for Internet links 30 to 40 times more than

the west.

By 2008, a large western University of around 25,000 students was likely to utilize over 500 Mbps of Internet bandwidth, while the University of Balamand in Lebanon of around 5000 students (20% of a large western University) did not even have 3% of that bandwidth. Moreover, the Lebanese Government could at anytime shape and suppress Internet voice and video traffic since it was not allowed in Lebanon. One more subtle yet important problem was that the Lebanese government does not recognize any degree which contains an e-learning component, leaving little room for such programs to grow.

4.4.2   Technical Issues

With no major Internet exchanges in Lebanon or the Middle East area, the Internet link quality suffers, and this is due partially to the small link bandwidth and partially to the somewhat large delays suffered in reaching the Internet 'core', causing degradation in the quality of Internet-based applications like Video Conferencing. Delays include video coding, switching, and routing delays which all add to the total link delay

Another reason for the link quality degradation is the Lebanese Internet Service Providers' (ISPs) lack of access to external link routers which are centrally managed by a company contracted by the government. We had to test the Internet links of 5 ISPs before finding a suitable link quality with an ISP who was able to manage the Quality of Service (QoS) of its international links. QoS is mainly used to minimize link delays.

Degradation in quality of service was witnessed by students taking the Arabic class using Video Conferencing. High image compression was required to accommodate the video within the 384 Kbps Internet link available to the VC system at Balamand.

Students were not always able to see the instructor's mouth while pronouncing the Arabic words and sometimes not properly seeing the words on the whiteboard written behind the instructor.

Audio quality was generally better than video quality. Occasionally however, certain short voice segments are replaced by soft strange sounds. This is due to lost audio packets which is common in routed networks such as the Internet. The speech was however almost always understood on both sides. The large video link one-way delay of around 0.7 seconds however affected interactivity during conversations. Students would start speaking at an instant when the instructor has already started speaking, but with the somewhat large delay, the signal would have not reached them at that instant, and vice-versa.

It is widely accepted across the telecom industry that one-way link delays should range from 0.15 to 0.25 seconds in order to carry an audio conversation comfortably (Gonia, 2004; Saxena, 2006). Even this small delay is too long for some countries like Sri Lanka and India whose language dynamics require shorter delays for effective and comfortable conversations especially in the absence of visual cues on which their languages heavily depend. But the cost of a full-fibre, switched rather than routed, Internet link with even a 0.3 second delay was inhibitive in Lebanon, so we had to live with the high delay.

Jitter or variable delay was also a problem in routed Internet links. Jitter in access of 0.03 seconds starts causing problems, problems that we had to live with and which occasionally caused freezing of the video link. Voice coding technology is also to blame for communication problems. The typical range of frequencies (400 Hz – 3400 Hz) used by a typical voice encoder is unable to cover some Arabic language letters (as well as letters from other languages) which fall out of this range and hence are not transferred through the VC audio link. This was a problem to the European students

whose mother-tongue languages were based on the Latin language, but posed no issue to a Turkish student whose language origins is shared with the Arabic language, as evident from the Post-Study Attitude Survey.

Also with 2D video used to represent 3D space, VC participants usually develop a general sense of skewed perception of the people and the general setting on the other side of the link. Another problematic issue involved security. Typical corporate firewalls only open standard ports like port 80 for web browsing. Applications like Videoconferencing require non-standard ports which should be explicitly open on a firewall after administrative approval. As this is sometimes not possible through a firewall, a special network connection would be required from the VC room to the external network, bypassing the firewall altogether, and posing a security risk to the VC codec itself. This issue was faced and dealt with in Balamand by dedicating a special firewall to the PC-based VC system after it got infected with spyware when directly connected to the external network bypassing the main University firewall.

4.4.3 Student Learning Issues

The students had a generally positive attitude towards the instructors and the material. They participated in class activities with enthusiasm and interest. Class participation in exercises confirmed the fact that the class attitude was generally positive. Students also exhibited discipline and motivation. Discipline was necessary for the class especially when delivered through video conferencing making it hard for the instructor to control the class. The age group and education level of the students were key reasons for the class discipline experienced. Students were initially motivated to learn Arabic, and this was obvious by the turnout and by class enthusiasm.

The student learning issues faced could be summarized as follows:
- o Dr Talal Wehbe who delivered the first part of the course had not previously taught using videoconferencing which limited his ability to deliver language

classes to his full potential.

o Since the first 1-hour session was attended by 24 students, the instructor had no time to associate more than a few names with faces. Moreover, the video feed of the 24-student class did not give the instructor a very good view of student faces, which made the association a challenge. He thus had to rely on the student name list and voice feedback in order to run the class. This problem was even more serious when the video feed occasionally froze.

o After the delivery of language vocabulary and practicing it with students, group activities were conducted for pairs of students to practice what was learned. The problem arose that monitoring class activity is difficult through VC and the instructor had no way to supervise student group work. A more powerful technology or method would thus be needed to facilitate the class-activity supervision process, potentially through the physical presence of a native Arabic speaker in the remote classroom to verify activities that are carried without the instructor's intervention or direct supervision.

o Just as it is in real classroom environments, breaks of silence provide an excellent technique for encouraging participation because of the opportunity it provides to get students 'busy' on in-class activities as in a normal classroom (Murphy & Ciszewska-Carr 2007). This was not always possible during Arabic classes. Silence would create discomfort since it might be misinterpreted as a disconnection.

o The audio connection delay somewhat hindered the instructor from immediately correcting student mispronunciation. When a student made a mistake in pronouncing an Arabic word, the instructor's correction was delayed due to the connection delay and did not reach the student in real time. The student thus carried on reading the next statement, and when the teacher's voice correction of the previous statement arrived to the student, the student back-tracked to correct their spelling of previous words. The delay thus limited real-time class interactions. To achieve real-time class interactions, the

round-trip delay of audio across the connection should not exceed 300ms.

o Throughout the language classes, learning scenarios were used to investigate their effectiveness in the learning process. After learning some Arabic words and putting together a few sentences, the role-play teaching method was applied. The instructor gave students certain roles to play and then the language practice proceeded according to these roles. Students started using the Arabic language in practical contexts and settings such as introducing oneself at the airport, getting to meet someone, communicating with a taxi driver, a Hotel receptionist, a restaurant waiter, and a Lebanese host.

o The instructor noticed that as the teaching method was changed during the Arabic class, students continued learning in the previous method. This was possibly due to the fact that they were told only once that the class delivery method would change. More emphasis should thus be given to communicating the new class delivery method with the students before actually starting with that new delivery method.

4.4.4 Organizational Issues

Organization of a remote class is no small task. Resources are required on both ends, and class structure becomes a critical matter. Here are some of the issues faced while delivering the Arabic class from Lebanon to the UK:

o The time difference of 2 hours required careful planning of class delivery times on both ends. Shifting from GMT to BST during the Pilot Study added to the planning complexity.

o It was not possible to have the same classroom available for students for all sessions and this required more organization on Nottingham's end. One class was interrupted to announce that another meeting was scheduled for the room where the class was held, and was due to start soon.

o The VC facility at Balamand was shared with other classes, making class

reservations essential to avoid conflict of schedules.

- o When a class had to be delayed an email sent by the instructor was not read by students on time since the day the email was sent was a public UK holiday.

- o Special arrangements are usually required for such research to be made. These include compliance with applicable ethical guidelines for conducting research, and sometimes the preparation of memorandums of understanding between institutions involved in the research, which was suggested by the Vice President for Academic Relations at the University of Balamand but was found unnecessary at Nottingham.

- o Synchronous VC sessions must be carefully prepared ahead of time (MacDonald 2008). Conducting VC testing was sometimes cumbersome since it was hard to coordinate times for testing by email on a short notice and sometimes even on a few-days notice.

- o There was more than a single contact with students when it came to course management, since recruitment and class scheduling was handled in the UK and the instructor was based outside the UK.

4.4.5   Cultural Issues

The course instructors Talal Wehbe and Riad Saba were happy to deliver the course and thought that it was a pleasant and positive experience. Several experiences gained in the process are noted below.

- o Humorous inter-cultural interaction took place when the students started using Arabic words in forming Arabic sentences. This was evident in the student and instructor laughter periods and enjoyment of practical exercises.

- o When one visits a foreign country for the first time, he/she has some time to adjust, perhaps on the plane, at the airport, on the road, at the hotel, etc. Videoconferences establish immediate cultural bridges with no induction or introduction. This problem could be an issue if one or both sides have no understanding of the values, norms and methods of the other side, norms that

if not known beforehand need to be transferred both ways. An Arabic Language teacher delivering a course to UK students should be familiar with the learning norms, standards, and etiquette in the UK educational system. If the teacher is not familiar with UK teaching methods he/she may teach in a manner that appears didactic or patronizing. Similarly, the students may appear disrespectful, not because of the lack of tolerance but because of the different cultural norms. As an example, it is common for students in the UK to call the teacher by the first name, but in an Arabic context, this would be impolite. This would take knowledge transfer, practice, reflection, and adjustment. The students and the teachers need to understand each other's cultural conventions, in order to reach an agreed approach to conducting the class in which both teacher and students are comfortable. If both sides are willing to adjust, this process could be enjoyable and enriching on both the personal and the pedagogical levels.

o   It would take special attention to address the norms and standards of the cultural context of the technology being used. How often are students expected to read their emails for example, or how much time are either students or teachers willing/able to spend online in the course of an educational process. Technology at its best could only simulate the user's familiar surroundings to eliminate or shorten learning curves involved in crossing cultural boundaries, but interaction with a teacher or with foreign students is another story.

4.4.6   Student Retention Issue

The student retention issue was classified on its own because it could have been influenced by all the above issues and other issues as well.   Table 4.1 shows a summary of the Pilot Study student attendance record.

Number of Students in a Group	Number of Sessions Attended by Group of Students	Remarks
12	1	12 out of the 24 students who attended the first session never showed up again
3	2	
4	3	
4	4	
2	6	Only two students attended all six sessions

Table 4.3   Student Retention Record

Since students who dropped out did not reply to emails asking them why they did so, it is only possible to connect known facts to probable causes of the low student retention. These causes follow:

- o Learning Arabic might have sounded like a great thing, but when faced with the difficulty of the language they might have decided to drop.
- o The 24-student first session was large and deprived students from actively engaging in learning activities which might have caused some of them not to continue. This was inferred from holding informal discussions with students that continued taking classes.
- o There was a field trip to London not declared beforehand, and scheduled on the day of the second class session. With several students missing that session, they might have felt they could not continue, but this could have been very well an excuse to miss the class.
- o It is probable that students who dropped had high expectations which were not met by the course. Although VC is a rich communication medium, it could have been a step back for some students.
- o The technical issues faced, especially the freezing video and disconnections in the videoconference might have been an important factor in student dropout.
- o It was the student's right to withdraw from the research project at any time. This right is secured by ethical guidelines for conducting research in the UK.

o There was no financial reward offered for those who complete the study. In Study-2 in which students were paid upon completing the study, the student retention was 100%.

o The course spanned a 3-month period and students lost interest over time. This is true for any new idea. At first the excitement level is high, and then it fades over time.

o The students were showing better command of Arabic pronunciation and more confidence in speaking the new language as the sessions were delivered. Language learning however is all about practice, and in the absence of such practice, command of the new language is bound to fade, which might have disheartened some students from continuing.

o As the semester progressed student commitment suffered because of mounting exam loads. An MSc in the UK is conducted over a 1-year period and is very demanding in terms of student time commitment, especially towards the Spring semester when the load gets high as one student reported in the attitude survey.

o The course instructor was switched mid semester, but this is unlikely to be a factor, because students who were still committed at the time of the switch stayed till the end.

o Some organizational issues might have also contributed to student low retention, including the short-notice email which was sent on a UK public Holiday and not read by most students, adding further to the difficulties in running a remote class.

Although the turnout decreased as the course went on, students who attended were actively participating in class activities and using their newly acquired skills during practice exercises, which showed their eagerness to learn the new language.

4.5   Informal Class Discussion Results

Informal class discussions were a source of information to assess learning effectiveness, and to adjust the learning environment based on student feedback. Informal discussions were held at the end of class sessions 1 and 3, and were used to make adjustments that were useful for the course. A discussion session was held after session 6, which was the last session, in order to reflect on the student learning experience. Below is a summary of these discussions and the actions that followed.

Small groups work best for online synchronous discourse. Recommendations range from 6-8, to fewer than 15 (Murphy & Ciszewska-Carr 2007). A large class (24 students for the 1st session) made it difficult to actively engage all the students in class activities. Since a smaller class would make the task more feasible, it was recommended to break the class into two sections of around 12 students each. As numbers shrank this issue became irrelevant, but the class was later split into 2 sections anyways.

During the wrap-up time after the first class session, five out of 24 students indicated to the research supervisor that the amount of material delivered during the session should have been greater. This implied that the material delivery rate was slower than the class intake rate. The material delivery pace was picked up in later sessions.

Students who attended were happy to take the material. The instructors found that active class participation in practice exercises confirmed the fact that the class attitude was generally positive. Feedback acquired after the class from different sources supported the conclusion above. Students expressed to the Supervisor a positive reaction to the course first session. The secretary of the School of Politics from which the students were recruited also confirmed a positive reaction from students after the class. A Syrian political science student reported that students were enthusiastic about the first class session.

Three students suggested to the instructor after the first session that class notes should be made available to them before the class in order to prepare before the class and to follow during the class. Class notes were delivered before starting the second class which improved student participation.

Students reported that they were not able to clearly see the writing on the white board which was situated behind the instructor while delivering the session because of the inability of the camera to focus the camera on 2 objects at different distances, so the writing size was increased to counteract the focus problem.

4.6   Post-Study Attitude Survey Results

4.6.1   Introduction

A post-study attitude survey was prepared to assess student attitudes after the study was over. The survey was designed based on the pre-study attitude survey and on several post surveys that were reviewed. The goal was to assess student attitudes towards VC as a learning medium, and towards the language course in general, in order to reflect on their experience, and to compare their attitudes before and after the Study. Students were requested to complete and send the post-study attitude survey by email.

The Survey started with an introduction that outlined the Survey goals and scope. Students were assured that their responses would be kept confidential and that they would remain anonymous. The survey contained 23 questions in three parts: student personal information in two questions, a set of 16 statements to assess student attitudes towards the language class for which the student was given a space for open comment on each statement, and a set of open ended questions that sums up student experiences.

After two email reminders, seven of the ten students who attended three or more classes filled these surveys and emailed them to the researcher. A version of the Post-Study Attitude Survey was documented that includes how students responded to each question (Appendix 4.5). The Survey produced the following facts about the attitudes of students that have taken the Arabic language course.

4.6.2   Participant Information

The personal information section consisted of two questions. The name of the participant, and the number of sessions attended. Out of the seven respondents, one student attended three sessions, four students attended four sessions and two students attended five sessions. Although the classes started with 13 males and eleven females, four out of seven students who forwarded the surveys were females.

4.6.3   Attitudes towards the Language Class

The main theme for question in this section was: How did the Arabic language class meet your expectations? The students were asked to circle one answer for each statement according to the legend below.

- o   Much better than expected
- o   Better than expected
- o   Little better than expected
- o   Neutral
- o   Little worse than expected
- o   Worse than expected
- o   Much worse than expected

The results of section II of the survey and student comments are detailed below, along with general reflections on the survey.

Statement/ Response	Much better than expected	Better than expected	Little better than expected	Neutral	Little worse than expected	Worse than expected	Much worse than expected
1. The amount of content delivered in the class		4		2	1		
2. The sense of presence in a real classroom		2	2	1	1	1	
3. The interactivity with the instructor(s)		2	4	1			
4. The difficulty level in learning a new language through this medium as compared to a traditional classroom-based language class			1	5	1		
5. Your command of the Arabic language after the class		1	4		2		
6. The practice exercises delivered during the class	2	1	2	2			
7. The instructor's ability to teach the class through this medium	2	2	1	2			
8. The quality and relevance of class material		3	3		1		
9. Your under-standing of the Lebanese culture after the class			1	3	3		
10. The general class atmosphere	2	3	2				
11. Your interest in learning the Arabic language after the class	2	5					
12. The direct delivery teaching method utilized in the classroom		3		4			
13. The role play teaching method utilized in the classroom	1	1	2	2	1		
14. The ease of the Arabic language		2	2	2			1
15. The importance to speak the Arabic language	1	1	1	3	1		
16. The technology tools used in support of the class	2		2	2		1	

Table 4.4   Post-Study Attitude Survey – Section II Results in Table Form

Four students responded that the amount of content delivered in the class was better

than they expected, two students were neutral, and one student found it was a little

worse than he expected. One student commented that once the class sizes reduced, the amount of content improved. Another indicated that the content had a good range of vocabulary covering different topics. A third student indicated that he felt a little rushed at times, and got the sense that he learned to repeat what was written on the handouts without actually learning what he was saying.

Four students responded that the sense of presence in a real classroom was better than they expected. One student commented that it felt like a real classroom. One student was neutral, and two students found it was worse than they expected. One of the two commented that video quality and time delay hampered discussion.

One student was neutral, and six students indicated that the interactivity with the instructor(s) was better than they expected. One of the six commented that it was

"generally very good, but some difficulty with sound quality."

On the difficulty level in learning a new language through this medium as compared to a traditional face-to-face language class, five students were neutral, meaning that they were expecting this level of difficulty. One found it was quite difficult, and one found it was easier than expected. One student commented that there wasn't much difference between a VC class and a face-to-face class. Another commented that

"with better communications technology it would have been better, but poor picture quality, poor sound and time delays did not help."

Five students indicated that their command of the Arabic language after the class was better than they expected, while two students found it was worse. One student indicated that the time of year made it difficult to make the best out of the lessons (i.e. practice at home). Five students found the practice exercises delivered during the

class better than they expected, and two were neutral. One comment was:

> *"These were good fun. The instructors made sure everybody had practice with the exercises."*

On the instructor's ability to teach the class through this medium, two students were neutral, meaning it was not better and not worse than they expected. Five students indicated it was better than they expected. One student responded that it was quite difficult to get the same sort of interaction as in a real classroom. Six students indicated that the quality and relevance of class material was better than they expected. One student found it was worse than expected. Students made several comments on this statement. One student commented the discussion was interesting, but was more concerned with random vocabulary, while constructing sentences was very difficult as there was little focus on preposition/verb conjugations etc. Another student commented that in aiming to teach the basics of Arabic for a trip to an Arabic speaking country, the class material was very relevant. A third student needed more help for the spelling of different words. A fourth said that it would have been better to get to grips with the basics early on- e.g., greetings and numbers etc., rather than learning seemingly arbitrary statements.

The students' understanding of the Lebanese culture after the class was generally not enhanced. It was because not much time was devoted to discuss cultural issues. One student found it was better than expected, three were neutral, and three found it was worse than expected. One student responded that the understanding improved a little, but not a great deal. Another commented:

> *"The instructor told us bits and pieces of Lebanese culture which was interesting".*

All seven students found the general class atmosphere was better than they expected, specifically when the number of students became smaller. One comment was:

"Everybody seemed to want to learn, and I enjoyed the informal discussions between us and the instructors. It was relaxed and enjoyable."

The students' interest in learning the Arabic language after the class was better than they expected. One student commented that he enjoyed it. Another indicated that he would be keen to improve on what was learned, though would choose more conventional teaching methods. On the direct delivery teaching method utilized in the classroom, three students responded it was little better than they expected, and four were neutral. One commented that direct delivery/Role-Play were useful teaching methods but were hampered by the videoconferencing medium. Another indicated that there was good balance between methods, and that the handouts were very useful.

Four students found the role play teaching method utilized in the classroom was better than they expected. Two were neutral. The one who found it was worse commented:

"Again, the role play situations seemed to involve us reading from a list and attempting to pronounce what was written correctly, rather than fully understanding and learning what we were saying. A slower pace may help in this regard."

Four students responded that learning the Arabic language was harder than they expected, two were neutral meaning they found it as difficult as expected, and one found it was easier than she expected because her mother tongue was Turkish which is closer to Arabic than Latin-origin languages. Three students felt it was important for them to speak the Arabic language. One of these three students who majored in International Security and Terrorism tied this opinion to his major. Three students

were neutral, meaning they did not change their opinion on the importance of learning Arabic. One said it would be useful, but far from being important.

Students were divided on the technology tools used in support of the class. Those who found it was worse than expected said that technological flaws were certainly one of the main problems, such as the video quality. They commented that email was fine and the LCD projection and audio were generally ok, but sometimes was a bit unclear. One commented that the whiteboard was useful, and the computer use for a couple of sessions was also helpful.

4.6.4 Open-Ended Questions

The last section of the survey was open-ended questions. All seven students responded to these questions. Student responses are summarized below the corresponding questions.

Question 1: How different was the learning experience from that of a traditional classroom?

Four students found that videoconferencing was very different from a face-to-face classroom. Three found it was different in a negative way. When picture quality was poor, they couldn't see the mouth of the speaker when pronouncing words and they couldn't see visual aids on the whiteboard. There was less ability to interact and they couldn't ask as many questions as they wish due to the slow connection. It was harder to hear specific sounds, and one had to speak rather slow and very clearly in order to have the other party understand. The fourth student said that

"it was definitely a new experience, but it actually wasn't that bad at all".

Three students found it was a similar experience. One commented that although Riad

(the PhD researcher) was not physically in the room, he led the class and delivered very good lessons. Another commented that VC and face-to-face were quite similar, but VC was slightly less interactive. A third indicated that it was a similar overall experience. He enjoyed the novelty of being taught directly from Lebanon, and would choose it over a traditional classroom under the best learning conditions.

Question 2:   What were the success areas for the video conferencing medium?

Being able to be taught directly from Lebanon by a native speaker was the response of five respondents. The interactivity which was similar to an ordinary classroom is another success area noted by students. One student saw that the main benefits were more cultural. He added that there would be potential for constructive cooperation and interactions with students in Lebanon in the future. One benefit a student noted is that students are very quiet so they can hear the teacher, therefore they were more concentrated as well.

Question 3:   What are the aspects of difficulty in learning the Arabic language by videoconference? What could be most improved?

Even with handouts solving part of the problem, most students said that video and audio quality caused learning problems and needed improvement. One student commented:

> *"I wasn't always sure that my pronunciations were right because at times it was difficult to hear".*

Another student observed that if the language was not Arabic, but a Latin originated one, the students would be more successful, because most of them were Europeans familiar with Latin pronunciation and spelling.

Question 4: Would you like to and/or recommend to take language classes through large-screen video conferencing? Desktop video conferencing? Any other technology-based method? Please explain why or why not.

Four students commented that they would take or recommend taking VC language classes, provided classes have a small group, and connectivity problems are ironed out. One student indicated that the lessons were huge fun and that he really enjoyed the experience. There was no inhibition felt because of videoconferencing. Two students preferred traditional based language learning saying it is easier to interact, to hear pronunciation, and to get one-on-one help. One student said she lacked the experience to answer the question.

Question 5: How would you describe your confidence in using the Arabic language after this class? Are you ready to open a conversation with an Arabic- language native speaker that knows no English?

Three students were somewhat confident in using Arabic. Their confidence was quite good given that they had just a few classes. Even though they couldn't dive deep into grammar, they learned the basics on which they could build more.

Four students were not confident. One student was doubtful he would understand when spoken to. Another would struggle to open a conversation with an Arabic language native. They all agreed that more lessons were needed over a longer period of time. A general comment by a student who attended four sessions was:

"I think the timing of the course was unfortunate, in that I did not have enough time to do the homework or to practice before each session".

4.6.5   Survey Summary

The survey reported the student experiences after taking the language classes. These experiences were consistent with the issues which were observed and outlined by the researcher in section 4.4, including technical and learning issues. Connectivity problems caused degradation in audio and video quality which affected the learning process negatively.

On the other hand, the delivery method, the amount and quality of class content used, class interactivity and practice exercises, the ability of the instructor to deliver the class, as well as the general class atmosphere, were found better than what most of the seven student respondents expected.

Students found merit in learning from a native speaker based abroad, and some would take or recommend taking a similar class provided the technical issues are resolved. Classes needed to be small for better interactivity, and more classes were needed to build student confidence in using the new language skills, provided they could allocate appropriate attention to language practice.

4.7   Recommendations and Further Work

Several restrictions confronted any further studies from Lebanon. These included geopolitical and technical problems outlined in section 4.4, as well as organizational problems in running the research study remotely. It is thus recommended that further studies be conducted on site in the UK. Besides this general recommendation, a list of technical and organizational recommendations is detailed below based on experience built during the testing and running of the Pilot Study.

Students should be able to practice what they learn. Language learning relies heavily on practice. MacDonald (2008) recommends using students' names during the sessions, and encouraging non-participants to contribute, perhaps by taking turns.

This is obviously only possible in small class settings. More work thus needs to be done on keeping students motivated by giving them more individual attention through smaller classes. A student commented in the post-study survey that the general class atmosphere improved after the first session which had 24 students. During the delivery of lessons, students were obviously enthusiastic about joining in on discussions and practicing learned material. This is simply not possible with a large class like the first one which had 24 students.

Practice outside the class is also very helpful for students to retain acquired language skills. This is easily attainable when the student is living in the country where the language is spoken.

Synchronous VC sessions should not be longer than about 45 minutes (Henschell, in Brandon 2008) in discrete 5-7 minute segments separated by discussion or time for reflection (Driscoll 2002). This was the case in the Arabic language classes conducted and is recommended for future studies. Recording the video interactions would provide a rich supply of information by analyzing the classes for critical incidents which might be forgotten or go un-noticed by the researcher.

The ability to connect the instructor's computer screen to the VC system would improve visibility of course material, allowing the instructor to write clearly, and the class to be taught more efficiently. However, the instructor did not find it practical to write on the PC and project that to students, since writing Arabic phonemes using English letters required sometimes special symbols to be inserted through the keyboard which was time consuming. There was a need for a tablet PC that would allow free hand writing to be projected on the PC screen.

Teaching effectiveness could improve if the transfer of the instructor's PC screen across the VC link would take place in real time alongside the main video feed within

the same frame through a picture-in-picture type setup. Switching between video feeds should be under the teacher's control in such a case.

The use of an outside-class asynchronous collaboration tool such as the Virtual Learning Environment (VLE) WebCT could have been useful outside class times, by providing the student with more reference material, and by providing more opportunities to discuss the material or any relevant issues. Web-conferencing software also could be useful by providing for better student-teacher interactivity, and thus for a better class supervision process.

Improving the link quality is essential to get better results out of the course. A 512 Kbps switched link would give the students a better sense of being present in a classroom, and would improve the overall class quality. Referring to VC technology, it is claimed that "robustness of technology is no longer an issue" (Martin 2005, p403), but the limitations of dial-up or low-end broadband internet connections are still problematic. Synchronous VC tends to require significant bandwidth, but synchronous applications have reached a level of reliability and accessibility that make them a real option alongside other techniques. According to Martin (2005), even the most conservative institution might use synchronous applications from time to time, confident in their students' ability to participate.

Using High Definition (HD) VC would provide much better resolution and image quality allowing physical cues such as mouth movements, eye twinkles, and other gestures be transferred across the network link thus adding to the quality of the learning interactions. HD standards also support multiple audio/video inputs/outputs. These include document cameras, dual video feeds, DVD players, and PC inputs/outputs, allowing the instructor much more flexibility in delivering the classes.

Tele-presence systems utilize HD VC, life-size large screen projection technology,

video and audio follow-me features, and 'one-half' meeting room architecture to simulate real life meetings, where the other half meeting or board room closely simulates the real thing on the remote side, to a high degree of fidelity, fooling users on both sides that they are physically present with the remote users. While handshaking is not possible in such systems, they could offer a lot to remote learners, both in one-to-many and in many-to-many collaborative learning environments, provided cost of technology is reduced to a suitable range.

4.8   Chapter Summary

The chapter introduced a pilot research study, outlined its objectives and described how it was conducted. It also explained the issues faced and discussed the results of the attitude surveys conducted before and after the Study. The chapter concluded with recommendations leading to further studies in the context of the PhD research project.

The research study was successful in accomplishing its objectives. It helped the researcher build experience on the several aspects of conducting a research project in the UK, even when he was based half-way across the globe. The Study also highlighted the restrictions posed by technology in Lebanon, and showed the shortcomings as well as the affordances of VC as a medium for language learning.

As requirements for further research studies included the delivery of face-to-face classes, and as Virtual World technologies were also a demanding factor not readily available oversees, it was concluded that any further studies could not be conducted remotely from Lebanon, and necessitated the presence of the researcher on-site in the UK. This was especially evident after the Pilot Study.

Chapter 5

Virtual World Learning Space Design

5.1   Introduction

5.1.1   Overview

In the course of answering the research question, whether VWs could be utilized for the effective delivery of language classes as compared to traditional media, a Pilot Study was first conducted in 2007, followed by Study-1 in 2008, and Study-2 in 2009.

The Pilot Study was carried out to investigate the research environment in the UK before conducting a main study. It involved delivering language classes through VC from Lebanon to UK-based students. The Pilot did not use VWs as a medium of learning since the VW learning space was not yet fully designed and developed for the purpose of conducting the research studies.

This chapter covers the VW learning space design and development process. It starts with an account of the main design requirements for learning in the VW which were rooted in the literature survey on learning in VWs. It then goes on to justify the choice of the VW platform for the Study, highlighting the stages of the learning space development, including an account of the technical and administrative issues and decisions that were taken leading to its utilization in the studies.

The Chapter then goes on to describe the set of interactions that were actually utilized for the purpose of the studies, and concludes with other kinds of interactions that could take place in a VW learning space.

5.1.2 Design Requirements

Drawing on the review of literature on the potential for VWs in learning that was carried out in the context of learning theories as explained in section 2.4.5, the VW learning space that was used for the research studies had to meet certain design requirements and criteria that were conducive to language learning. What follows is an account of the main design criteria for the VW learning space used in this Study.

The VW learning space had to allow for real-time audio communication among users and between the instructor and users. The quality of the audio needed to be good enough to allow natural communication and to hear pronunciation, and to facilitate group practice of learned material.

The VW learning space had to have an ease of use that allowed users to learn the basics of online use and interaction, and to be able to focus on language learning rather than technical details of operation.

The VW learning space had to allow for interaction between the user and objects that facilitated learning. This allowed for individualized learning, and served to match learning delivery to the rate of learner ability to absorb material, and gave the learner a better sense of being immersed.

The VW learning space had to be flexible in terms of the configuration of meeting places allowing the teacher to easily configure learning spaces suitable for the learning activity at hand.

The VW learning space had to be manageable by its users when it came to choice of identity and in-world apparel. It also had to provide for naturalistic settings for learning that would give a sense of presence to facilitate the role-play activities that took place during the learning sessions.

5.1.3   Choice of the Virtual World

While several VWs were available for the studies such as Active Worlds, There, and several others, Second Life (SL) was chosen for several reasons.

SL was readily and freely available to its users through desktops or laptops running Microsoft Windows, which was the operating system used on all PCs that were used for running the research studies.

SL allowed for construction of learning spaces required for the research studies. It supported the learning design requirements through offering interactions such as voice, and it allowed the building and manipulation of several learning objects and spaces such as role-play areas. SL also had a marketplace for the researcher to purchase objects that were required for the studies.

Freely accessible sandbox testing environments were available in SL for temporary testing of learning spaces during the early stages of the research. However the objects were automatically returned to the PhD researcher after a certain time period, typically around three hours.

SL was used worldwide through the Internet by a large population of residents allowing an easier process of recruiting participants who used it. The number of Second Life user accounts grew from 230,000 in April 2006 to over two million by the end of December 2006. It broke three million in January 2007 and passed four million in February 2007 (Hiles et al., 2007).

Academic organisations were starting to use SL on a large scale by setting up their own presence through purchasing 'islands' on the main SL grid, including the Open University island where the development of the learning space for the PhD research

first started, and the University of Nottingham Island where the PhD research studies were conducted.

5.2   SL Islands Utilized

5.2.1   The Open University Island

Upon a recommendation by the PhD supervisor, a VW design space was made available to the PhD researcher on Schome (School-Home) Park, a SL private island maintained by the Open University. In order to setup the language classroom, an experimental phase extended from late 2007 to mid 2008, during which several issues needed to be resolved.

On February 27, 2007, Linden Labs, owner of SL announced that voice communications would be available in SL in the following 3 to 4 months. This was significant to the research project as voice was required to allow for proper language learning in-world.

Voice was, however, not well received on the island. Island managers preferred to stick to text-chat at the time of the experimentation, and discouraged the use of voice. They felt that audio altered the nature of the VW experience, making it less immersive. Text chat-based communications took much longer than audio chat, and made conversations unnatural and stressful. Text-chat was useless for language learning activities that rely mainly on hearing and vocal pronunciation.

Another problem that was faced concerned the text-chat window used in SL's client software. Text chat in SL was unable to group Arabic letters into words. Unlike English, Arabic has a symbol for each letter which when used within the word is different from the symbol for the same letter when used alone, and it was only possible to type Arabic letters alone, which made the Arabic words unreadable. This

matter would have necessitated writing Arabic words using English letters.

All VW class interactions needed logging for later analysis, and while it was possible to use software to record all graphical interactions as desktop video screen captures, logging audio in SL was not possible at the time which threatened to reduce data available for the research. The acceptable use policy in Schome Park Island did not permit the sharing of real world names. The implications of this policy on the teacher-student connection were not clear while conducting initial testing.

An area of around 2,000 m^2 was available for VW experimentation on the OU Island. This area was however insufficient for several reasons. Moving avatars inside a classroom built for pilot testing proved to be difficult in SL, and a larger open space was thus needed for participant avatars to be able to move around more freely. More area was also needed to create the language learning spaces. Island managers gave an extra space to setup the classes in the sky, but this space was unreachable by the PhD researcher's avatar and was never utilized. The space available on the OU island was not sufficient to minimize voice interference between users and groups as they practice their language skills, and later testing showed that a virtual area of around 18,000 m^2 would be required to setup the VW classroom space for a group of 8 to 10 users taking a language class.

The number of basic building objects, called prims, was restricted on the Open University SL island. This was due to the fact that the more prims that were used, the more time it took for real-time rendering of these objects and the slower performance of all island related activities, including navigation, changing perspectives, and building.

5.2.2   The University of Nottingham Island

Given the issues faced with Schome Park Island, another island was needed to build

on the experience of Schome Park in setting up the VW learning space. A large-area, voice-enabled space was needed to run the studies.

During 2007, the University of Nottingham (UoN) was still developing the idea of setting up its own SL Island through a special committee that met for discussing the pros and cons of such a move. The committee made its decision, and the University of Nottingham acquired a SL island. On Friday February 1st, 2008 accessing the SL main grid was made possible through the UoN fixed network for the first time.

The University delegated the management of its SL Island to the e-learning team at the Information Services Division. Contact was made with the team leader who showed readiness to support the PhD research Study. After several meetings, the support materialized during September-November 2008, when Study-1 VW classes were conducted on the University of Nottingham SL Island.

5.3   Technical and Administrative Issues

5.3.1   Network Connectivity
The University of Nottingham Information Systems Division needed to make sure that network periphery firewalls would not limit connectivity between the computer lab facility used to run VW classes and Second Life servers.
This was not a straight forward matter. SL was expanding at a fast rate at the time, with millions of new users joining SL every year. New servers were added to their data centres to serve the increasing load, and new Internet addresses (IPs) needed to be allowed access through network firewalls.

A minimum of 1 Mbps Internet link per desktop or laptop used to access SL servers, with a round-trip delay of no more than 300 ms in reaching the servers was required in order to avoid any noticeable delays in controlling the SL avatars.

5.3.2 Hardware Requirements

The SL client required a set of minimum software and hardware specifications before running on desktops and laptops used in the research. The client supported Windows 2000, XP and Vista operating systems by Microsoft. The computer processor needed to run at 800 MHz, with a Pentium III quality or better. The client also required a minimum RAM memory of 512 MB, and a graphics card with 32 MB of memory that supported 32-Bit colour quality.

This allowed for SL audio and video graphics to have an acceptable quality for providing a certain degree of realism. Each desktop and laptop personal computer used in the research studies was tested to make sure it satisfied the minimum specifications required.

5.3.3 SL Server Maintenance and Availability

Another issue to manage was the SL server maintenance, updates and upgrades by Linden Labs that usually took place on Wednesdays. These updates limited VW functionality, and posed a restraint on the VW class scheduling process. It was necessary to monitor the SL website for information on scheduled maintenance dates and times so as to go around it in scheduling SL classes. Server maintenance work that required restarts causing the main SL grid to shutdown has become less frequent, with one shutdown every three to four months (Savin-Baden, 2010).

While SL server crashes were not uncommon during the time the studies were run in the Fall of 2008 and 2009, no crashes were experienced during the VW classes. There has been however issues with voice that hindered the progress of some classes held in SL.

5.3.4 Programming of Interfaces

Programmable objects that play sound files when touched in SL were tested and

worked well on Schome Park Island. However this was not sufficient for covering the scope of learning scenarios and interfaces needed for the studies. Program codes in a language called SL scripting language were needed to build the learning space according to design requirements.

Several meetings were held with the E-learning team at the University of Nottingham to discuss the requirements for building the learning spaces, to see what would work, and what would not in light of available resources. Discussions allowed the team to develop the required program codes using the SL scripting language.

The program codes were used to load images and sound files onto learning objects like screens and practice boards, and to define how these objects would be controlled, i.e. how the user would move between slides or how the user would play a sound file, etc.

The researcher tested the learning objects that were developed, and used them to build learning spaces with the scenarios and interfaces required for the studies. The texturing was performed by the researcher to give the learning objects the shape, colour, and size that were suitable for the learning space before positioning them in their suitable places.

5.3.5   Time to Develop Content

With the program codes made available, building the space was straightforward. It was however a very time- and labour-intensive process. For each of the 20 to 25 interactive learning objects developed, 15 to 20 images and another 15 to 20 sound files had to be individually prepared and recorded, formatted to a specific format suitable for SL, uploaded to SL servers, referenced in the interactive object's program, uploaded to the program, and then tested for functionality. When any problem was discovered in the quality of the image or the sound recording, the process was

repeated again.

After a learning object was tested to be working as intended, multiple copies of that object were situated at suitable locations around the learning space, and adjusted for easy accessibility and usability by users. This process took tens of hours for each Arabic lesson delivered in SL, and 100s of hours for each of the two studies conducted.

5.3.6   Budget needed

For each image or sound file uploaded to SL servers a cost was to be paid in Linden Dollars, the currency in SL. While a US dollar was about 250 Linden dollars, the amount of content that needed upload into the learning space quickly pushed the cost up. Each study required a budget of around 100 GBP to upload the content to VW servers.

5.4   Language Space Design Used for the Studies

5.4.1   Learning Space Overview

The area available for the studies on the University of Nottingham Island was around 18,000 m^2. It was divided into three parts, the central class area, the personal practice area, and the role-play area (See Figure 5.1). An information panel currently stands to identify the purpose of the learning space (See Figure 5.2). When the panel is touched, a note card is offered for the user to keep that displays the learning interaction possible within the language learning space (See Figure 5.3).

Practice Area

Central Classroom Area

Role-Play Area
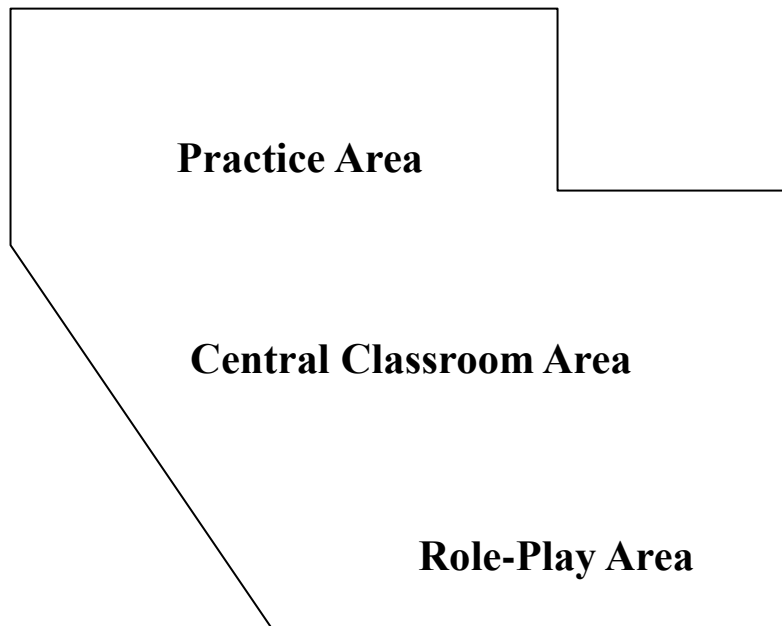
Figure 5.1   General Layout for the SL Language Learning space built on the University of Nottingham Second Life VW

Figure 5.2   VW Information Panel
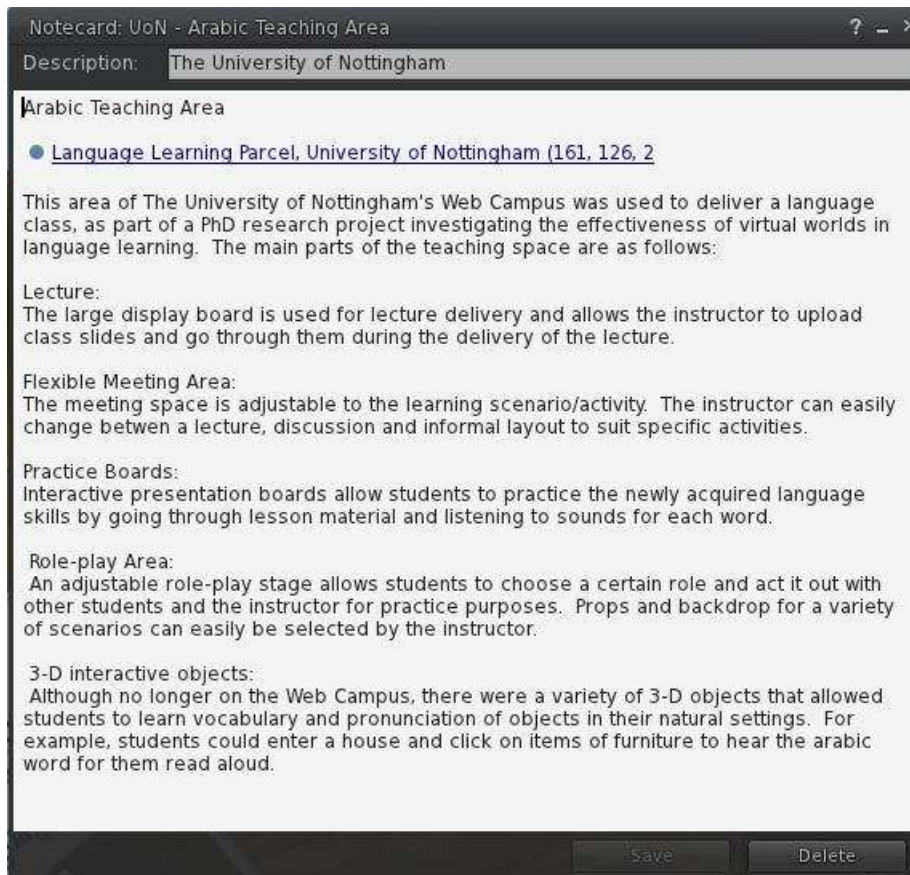
Figure 5.3   A note card that explained the language learning class setup

5.4.2   Central Classroom Area

The VW central classroom area was setup in a format similar to a typical classroom (See Figure 5.4). Real time in-class interactions between the instructor and the students using voice communication allowed for conducting classes similar to those delivered in a face-to-face class. Large presentation boards were used in front of the student chairs with the class notes programmed to roll when the instructor wanted.
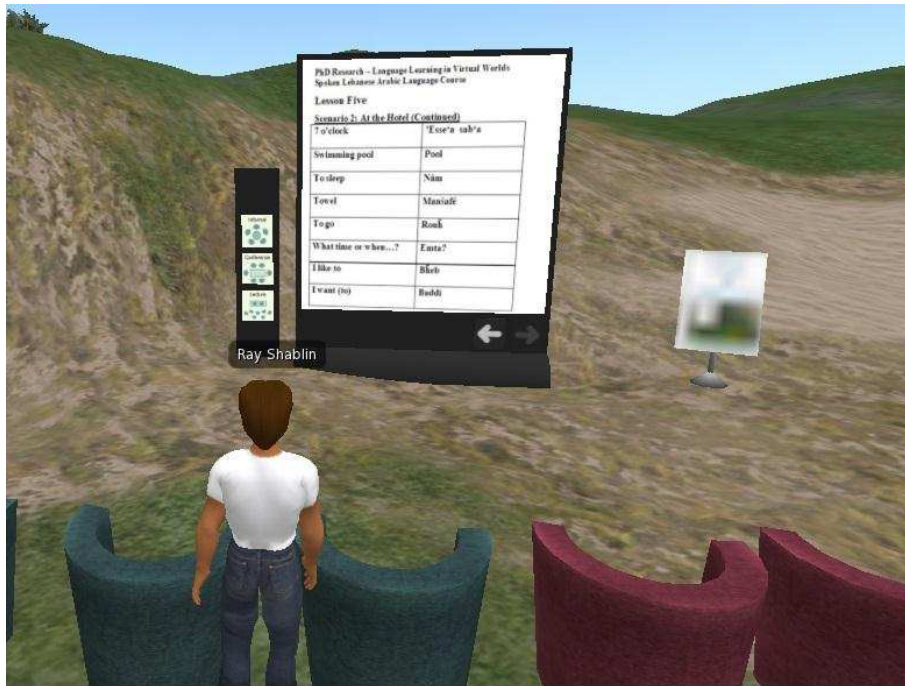
Figure 5.4   VW Central Classroom Area, with the presentation board seen at the centre

5.4.3   Learning Space Seating Arrangements

A set of three pre-programmed re-configurable seating arrangements were available for the classes. A control panel allowed the instructor to choose a seating arrangement suitable for the type of learning activity taking place (See Figure 5.5).

Besides the normal lecture setup shown earlier, the instructor was able to move pairs of students sitting in their chairs far apart to practice language skills without causing voice interference between the pairs (See Figure 5.6). Collaborative learning was possible through this one-to-one informal arrangement. It allowed students to practice their newly acquired language skills during lessons, and also allowed tutoring help during class or during 'office hours'.
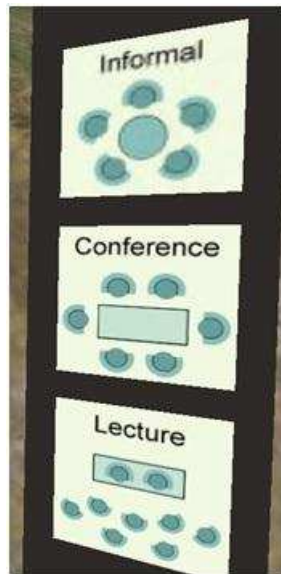
Figure 5.5   Control Panel for the possible VW class seating arrangements

Figure 5.6   Pairs of Students spread far apart in the one-to-one informal seating arrangement

The third seating arrangement was that of a conference, where a large group of students could meet around a circle for discussion sessions (See Figure 5.7). This was needed for informal discussions that took place after classes were over.

Figure 5.7   Conference seating arrangement
used for class informal gatherings

5.4.4   Practice Area

Participants had access to class material in the form of graphic boards that displayed the class content under themes that corresponded to lesson activities, with one board per activity (See Figures 5.8 and 5.9).

A board to teach about the family, for example, contained the English word 'family' or a picture of a family. When the student touched the sound button located to the bottom left of the board, the English word as well as the corresponding Arabic word would be heard. Pressing a forward navigation button located to the bottom right, a picture or a name of a family member (father, daughter, etc) would be displayed, and when the sound button is pressed again, the student was able to listen to a pre-recorded audio file that pronounced the Arabic word for that family member.

Students were able to access the practice area any time for reviewing class material and for practicing pronunciation. They were able to play the sound files however many times were needed to grasp the Arabic language vocabulary and pronunciation of difficult sounds.

The practice boards were placed far apart during the studies in order to minimize sound interference. It was found that a minimum distance of around 70 meters was

required between any two boards to avoid sound overlap taking place in SL.
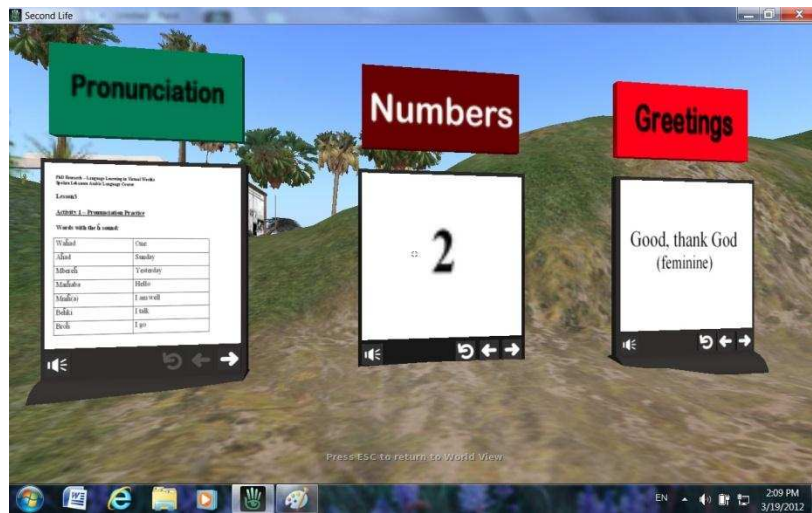
Figure 5.8   Practice boards, with one board per class activity. The sound button is seen to the bottom left and the navigation buttons to the bottom right.

Figure 5.9   An overview of some of the different practice boards used for the studies. Unlike the figure, the boards were spread far apart during the studies to minimize sound interference

5.4.5   Role-Play Area

As noted in the literature review, VWs inherently carry a capacity for role-play. Part

of the learning design was building suitable 3D setups that would allow students to practice their Lebanese Arabic language skills in different scenarios such as 'at the Airport', 'in the Taxi', 'at the Hotel', 'at the restaurant', 'at the University', etc, centring around one theme, which was visiting Lebanon to attend a conference.

Role-play scenarios were implemented with a flat stage-like backdrop that allowed loading a different image for each scenario. A few objects like chairs, tables, desks or kiosks were laid out on stage as needed for each scenario (See Figure 5.10). Students took their positions around the stage as needed for the role they were playing during language practice.

Loading an image to go in the background was much simpler than building a 3D setup for each scenario. A problem was faced however with obtaining permissions to use copyrighted images off the Internet. No reply was received after a request for using images from a database of Lebanese photos, and the University of Nottingham policy did not allow for using copyrighted images without permission. The problem was solved by using images from a media database that was available on the University website for internal University use.

Figure 5.10   Role-play   area   where   the   stage allowed   the   loading   of   images   to   simulate   an authentic place

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5.4.6   Immersive Learning Spaces

Early in the research, scripted objects that pronounced their meaning in Arabic were developed. A 3D chair, for example, would produce the sound 'Kersi', Arabic for chair, when touched by the student. These objects were organized in themes. A chair was part of a dining table set, for example, and the dining table was part of a dining room inside a house that the participant could walk throughout touching each and every desired object, listening to its Arabic language equivalent (See Figure 5.11).

This allowed for on-demand interactions of participants with the learning space to practice on their own in a natural appropriate-type setting. Two such settings were partially developed, including a house and a grocery shop but were not used during the studies for class time and island space limitations.

Figure 5.11   Inside a Virtual House

5.5   Optimal Language Learning Space Design

Optional spaces and interfaces that could have allowed for an optimal design of the VW learning space, but that were not implemented, are outlined below. To allow for a true immersive cultural experience, animated landmarks in Lebanon like the Cedars Forest, the Baalback Temples, or the Jeita Grotto could be constructed in SL to support classroom discussions, and to introduce the Lebanese culture and heritage. Much investment in time and money would be needed to construct such learning

spaces, and so they were outside the scope of the research Study.

SL allows user access to online videos attached to scripted objects or boards. Short Arabic language discussions could have been videotaped and included in the practice area allowing students to listen to a normal conversation between native Arabic speakers in support of the learning process.

In-world libraries which were becoming popular could enhance the learning experience by providing reference material for students. In-world access to the Internet could also offer diverse learning opportunities available through web pages or web 2.0 technologies. Resources available to SL users through the Internet include whiteboard, communication and collaboration tools like desktop web-conferencing applications, language translators, and information centres.

Tools that introduce the functionality of Virtual Learning Environments like Blackboard or Moodle to SL learners could offer a structured class management framework with a wealth of tools for learning. Sloodle was one such tool that offered Moodle functionality inside Second Life.

Content Management tools were needed to simplify the work of the instructor in setting up the learning space. Customizable learning objects with a predefined set of functions would also be useful to streamline the class development process and minimize the time required to prepare SL classes.

5.6   Chapter Summary

This chapter outlined the main design requirements for building a VW learning space, then projected these requirements in light of available VW islands and resources, giving an account of the stages of development of the learning space and technical and administrative issues faced during development. The chapter then showed with

graphical illustrations the learning spaces that were constructed to meet the design requirements for VW learning spaces, and concluded with a set of possible designs, interaction methods, learning tools and resources that could have been available for students within the SL learning space.

Chapter 6

Study-1

6.1   Introduction

6.1.1   Background

The topic of the present research is language learning through Virtual Worlds (VWs). The focus of the research is to explore the potential of VW technology in improving the quality of language learning and to design/customize an optimized VW environment for that purpose. The main research question is: 'Could language learning be effectively delivered through VW technology as compared to other, more conventional media?'

After a Pilot Study described in chapter 4 was conducted between March and June 2007, more information was available to guide the design and implementation of the main research study. The Pilot Study involved delivering an Arabic language class from Lebanon to UK-based students through videoconferencing. Pilot Study issues faced made it clear that the limitations imposed by technology hindered the long-distance implementation of the new Study. The technical and organizational issues among other issues faced during the Pilot Study are explained in chapter 4 under section 4.4.

The Pilot Study results showed it was restrictive to conduct further studies while the researcher is based in Lebanon. The researcher thus needed to travel to the UK in order to conduct Study-1 and Study-2. Planning for research Study-1 started in late 2007 and a plan was completed in February 2008, which included both the technical requirements and the general design of the study. Study-1 was conducted between September and November 2008. Study-1 overview, objectives, design, description,

results and relevant recommendations are detailed in this chapter.

6.1.2 Overview

In August and September 2008, 30 post-graduate students/staff were recruited from across the University of Nottingham to sit for Lebanese Arabic Language classes. The classes were delivered to participants between October and November 2008. A language aptitude test called the Modern Language Aptitude Test (MLAT) was conducted during the first meeting. Based on the MLAT and other criteria, participants were divided into three groups with similar language aptitude.

Six language classes were then delivered to each group using one of three different media, face-to-face, videoconferencing and the Virtual World (VW) Second Life using the parallel class- delivery model explained in section 3.3.1. Student pre- and post-attitude surveys were documented, informal interviews were held, and an assessment of student learning was conducted. Reflections were made through a comparative analysis between the three media based on the above information, and also based on a qualitative critical-incident analysis of video-taped classes.

6.1.3 Study-1 Objectives

Study-1 is designed to explore VWs as a rich communication media for the students to understand and use the spoken language, and to benchmark the quality of language learning (LL) through the VW Second Life relative to a face-to-face classroom, and a videoconferencing classroom. The objectives are outlined next

Study-1 is required to develop a feel for the opportunities offered by a VW as a language class delivery medium to better utilize it at a later stage.

Study-1 is designed to explore the challenges created by the VWs media, allowing for the discovery of shortcomings and technical challenges facing the VWs media, thus

allowing for a finer adjustment of later research studies.

Study-1 is designed to investigate the effectiveness of VW media in LL compared to other methods of whole class teaching, through a comparative analysis between learning media.

Study-1 outcome is hoped to facilitate the formulation of a set of results that would serve as a reference in guiding the practical utilization of VWs for LL, serving as a stepping stone for further research work in the area of VR in LL.

6.2 Study-1 Design

6.2.1 Language Taught

The choice of language to be taught was important. As with the Pilot Study, Lebanese Arabic was chosen for the language classes. It was evident from the Pilot Study surveys that Arabic was attractive for UK students to learn, especially those students studying Politics and International Relations or Languages and Cultural Studies, as they tend to need foreign languages for their future careers.

Lebanese Arabic was chosen because the PhD researcher who would deliver the classes is a native speaker. Lebanese Arabic is also understood by over 300 million Arabs, and thus very useful to learn.

For a fair comparison between groups, participants needed to start on an equal footing when it came to language learning. This could have been achieved if the language to be taught is new to them. Arabic is new for a typical UK group of students and, even if few participants were exposed to Arabic, the exposure would have been very limited and should not affect the results of the Study.

There was a drawback in using Arabic for the Study. The Arabic language is not rooted in Latin, and hence had letters and sounds not known to a European community. It was obvious after the Pilot Study that learning Arabic was a challenging task. This challenge might have discouraged some potential participants from joining the study and some others from completing it.

6.2.2   Class Delivery Model

Due to the many benefits it brings towards answering the research question, the parallel model was chosen for Study-1. Participants were allocated into three groups, with each group taking the classes through one medium out of the three media that includes a face-to-face classroom, a VC classroom, and a VW classroom. The design implications for this model include the following factors:

- o Participants distributed across the three groups must be similar in age, educational backgrounds, motivation, and language aptitude, in order to produce three groups which are as homogenous as possible for a fair comparison to be carried.

- o The groups must be similar in size so as not to allow for a group to have an advantage over another, since smaller groups enjoy richer communications and better results (Murphy & Ciszewska-Carr 2007).

- o The class delivery plan should be similar across the three media in order to allow for a fair comparison, yet it must be adapted to the teaching media, to take advantage of the learning opportunities it provides. Similarities in the delivery plan across media include the rate of content delivery, the nature of content delivered, and the learning tools offered to students.

- o The final class assessment must be identical in form and substance across the three groups so that the comparison of learning outcomes would be objective and uniform.

6.2.3   Participant Selection Criteria

Based on the Pilot Study experience with research participants such as their language background, their education level, and their motivation to join a research study, a set of criteria was proposed for the selection of participants for the research study. These criteria were desired and might not have been always attainable, but were to be sought after as much as possible.

It was desired that Study-1 participants had no background in Arabic language, or any language similar to Arabic. Students with an Arabic background would not be suitable for the study as their assessment results would be biased and would not entirely reflect the contribution a certain media made to the learning process. Students with native languages which are 'sisters' or 'cousins' of Arabic might also have an advantage and would have to be excluded from the analysis.

As the Arabic Language classes would be delivered in English, participants should have attained college-level English language proficiency. This should be easily attainable as recruitment would be confined to the University of Nottingham constituents.

As the language aptitude test would be delivered via a computer-based test (CBT), and as the communication between the instructor and the students would be done via email, and as the VW classes would be delivered on a desktop PC, Study-1 participants needed to be confident in the use of computer technology. UK students at the BSc level and above are assumed to have suitable computer skills. Special training was required for participants that would be taking the classes through the Virtual World.

Participant commitment was obviously critical to the proper running of the Study. As UK applicable research ethics guidelines give participants the right to withdraw from

the research study at any time, prior to seeking consent, emphasis must be placed upon the importance of completing the classes by all participants, as an important condition to complete the Study successfully.

Since the classes would be delivered through three different media by the same instructor, it was necessary to find three different time schedules for the classes. Participant availability was necessary to match class schedules, which must accommodate the majority of participants in a certain group.

Frequent short discussion sessions are necessary to make sure any instructional problems are quickly resolved in order to retain participant interest and motivation, and to get a true picture of the pros and cons of a certain media. Participants thus need to be open and transparent to reflect their true experiences during the learning process.

6.2.4 Group Allocation Criteria

As the parallel class-delivery model has been chosen for Study-1, each of the three groups of participants would take the Arabic Language classes through a unique medium of instruction. Selecting the students across the groups is instrumental in producing three homogeneous groups, so that any difference in the learning outcomes would be attributed, for the most part, to the medium of learning that a group is using. The criteria for group allocation are outlined next.

The groups must be small, eight to ten students each, to insure student involvement, interactivity, and overall progress while still allowing a useful comparison across the media. Groups should also have a similar number of participants for a fair comparison of results.

The participants in the groups must be similar in age. This would eliminate any large differences in learning outcomes due to the age differences. The groups' participants

must also have a similar educational level, to produce three homogeneous groups, similar at every level.

Participant allocation across groups must observe participant time schedules. This might seem a minor issue but could pose a limitation due to the busy nature of participant schedules, being post-graduate university students or university faculty or staff members.

The groups must have similar motivation, leading to similar retention rates, and similar effort in language learning. Although no motivation test was planned for the purpose of measuring motivation, participant preferences could be documented as to which medium they would rather use, in order to keep them as motivated as possible, provided no conflict is made with other group-allocation criteria.

The groups must have a uniform distribution of participant language learning ability, known as language aptitude. A language aptitude test would need to be conducted in order to determine participant ability to learn new languages. Based on that test, student allocation into the three groups would follow a fair distribution to insure that the class starts with equal-level groups when it comes to language aptitude.

6.2.5   The Modern Language Aptitude Test (MLAT)

Aptitude for learning anything can be defined as the amount of time it takes an individual to learn the task in question. Individuals differ not in whether they can learn a task or not learn it, but rather in the length of time it takes them to learn it. This is true of foreign language aptitude.

For a fair comparative analysis between the VW medium and the two other media of instruction, the three groups of participants who are taking the classes need to be as similar as possible in their ability to learn a new language, or language aptitude, so

that the results of the comparative analysis would reflect the pros and cons of the media and not the group strengths or weaknesses. This would better indicate the effectiveness of the VW medium in delivering language learning.

Several language aptitude tests have been developed, but the Modern Language Aptitude test (MLAT), which was developed in the 1960s, has been the most used and researched, and has stood the test of time as it has been proven to be still valid with changing methods of language teaching, from the audio-lingual teaching methods used when the MLAT was developed, to the more communicative teaching methods utilized later. According to research conducted by Madeline Ehrman (Ehrman, 1994), the Director of Research, Evaluation and Development at the U.S. Foreign Service Institute, the MLAT produced validity coefficients at approximately the same levels as the original validity coefficients from 1958.

The MLAT test has five parts that measure different aspects of language aptitude. The Number Learning section is designed in part to measure the participant's memory, as well as an 'auditory alertness' factor which would affect the subject's auditory comprehension of a foreign language. The Phonetic Script section is designed to measure the subject's sound-symbol association ability, which is the ability to learn correlations between sounds of speech and the corresponding written symbols.

The Spelling Clues/Hidden Words section, a highly speeded section, is designed to test the subject's vocabulary knowledge of English as well as his/her sound-symbol association ability. The Words in Sentences section is designed to measure the subject's sensitivity to grammatical structure without using any grammatical terminology. The Paired Associates section is designed to measure the subject's rote memorization ability, which is a typical component of foreign language learning.

The MLAT test was administered as part of Study-1 to assess participants' language

aptitude, and to allocate the participants across the three groups accordingly, producing, as much as possible, groups which were similar in language aptitude.

6.2.6   Class Delivery Plan

This class delivery plan was a general one shared between the three media used for delivering the spoken Lebanese Arabic language. While it is very hard to follow a certain delivery plan to the minute, a typical 80-minute session was roughly divided as follows:

- o   Administration Time   (6 minutes)
    - o   Welcome statement
    - o   Scheduling – planning issues
    - o   Question and answer period
- o   Review of last session's material   (6 minutes)
- o   Lecture on new material   (20 minutes)
- o   Language practice time   (30 minutes)
    - o   Students with instructor
    - o   Students on their own (as applicable)
    - o   Students with other students
- o   Short in-class assignment   (10 minutes)
- o   Review of the session's material   (6 minutes)
- o   Short reflection session   (6 minutes)

In the first introductory session the course overview was delivered, research ethics requirements were addressed, and a language aptitude test was conducted. A special orientation session was needed to have those students taking the class through the Virtual World register with and get familiar with using the new environment.

During the second session participants filled a pre-study attitude survey. Activities took longer or shorter time than expected, but the overall activity schedule was controlled by the instructor in a way that ensured proper class progress while keeping

students motivated. Role-play activities were held as of the 4th session after participants gained some familiarity and command of the Arabic language structure and use.

The final session activities included filling in a post-study attitude survey, a final assessment, closing remarks, and a closing focus-group meeting which included interview questions that reflected on the course.

There have been some distinctive teaching methods and tools that are particular to a certain medium in order to exploit its potential. For example, tools were used in the VW medium that were not available to the other two media. Virtual interactive boards and role play areas were introduced to explore the opportunities of the VW medium to support self-study and role play. Participants had the chance to practice on their own through interacting with virtual boards, which when pressed, plays a sound file that included the English word and the Arabic meaning of that word.

6.2.7   Research Methodology

This section describes the research methods and tools that were used in Study-1. As in the Pilot Study, Study-1 examines participant attitudes before and after the Study, as well as participant feedback through informal discussions and interviews. Study-1 however contains two additions, the final class assessment to be able to compare between the results produced by each medium, and recordings of all classes across the three media, allowing for a critical-incident analysis of classes. Such analysis would lead to the discovery of breakdowns in the learning process as well as notable breakthroughs, information that would shed light on whether students using the VW medium performed worse or better than those using other media, and how well the VW contributed to the learning process. The information collection components of the research methodology used for Study-1 are detailed next.

The Pre-Study Survey was utilized to screen participants for suitability for the Study, dropping participants that had an Arabic Language background for example. It was also useful to collect participants' initial attitude and motivation towards learning the Arabic Language, to understand the participants' attitudes towards technology and the different media involved in the Study, and to collect information that would aid in the distribution of student groups as per the class delivery model of choice.

Short discussions were conducted in-class whenever needed to make sure that the technology used and the lesson material delivered were appropriate, and that the class progress was unhindered. Specific participant problems have the chance to surface in such sessions in order to be treated in-time.

The Post-Study Attitude Survey was employed to assess participant reflections on the media of instruction used such as their ease of use, their effectiveness, and the problems posed by each media in supporting language learning. The Assessment Test is a common test given to all three groups taking the Arabic course to assess the learning outcomes of each medium, including the vocabulary, speaking and understanding skills acquired and the ability to practice these language skills in practical situations. Interviews were conducted after the course was over in order to collect participant feedback on the entire learning process, reflecting on problems faced and successes achieved. One other source of feedback was the supervisor and the co-supervisor of the research project who observed certain VW classes giving their insight on the VW class delivery process.

The Critical-Incident Analysis method was employed on recorded videos of the face-to-face and VC teaching sessions, and on video as well as screen captures of interactions in the virtual world, seeking breakdowns in the language learning process or in learner motivation and interest, and also breakthroughs which one method/medium or another have demonstrated during the learning process.

The critical incident analysis starts with a review of recorded videos of lessons, and proceeds to a crude identification of incidents from the video/screen capture archives. Then transcripts of the dialogue and interactions for critical incidents are generated and analyzed to infer sequences and themes of repeated incidents, their potential causes, the problems behind them, and their possible repairs.

Each critical incident observed by the PhD researcher is logged on a Transcript-of-Incident template (See Appendix 6.11) which specified the Study name (1 or 2), the medium used, the incident number and title, the lesson and date, and the time into lesson when the incident was observed. When all papers are collected, they are reviewed and categorized according to the nature of the incident, weather a breakdown or a breakthrough. Then each category is reviewed for certain patterns or themes of occurrences, and after thematic analysis, main themes are determined for each category.

Once the above information was collected, a comparative analysis was employed to analyze the whole corpus of data gathered across the three different media of instruction, leading to an assessment of the quality of language learning outcome of each medium, and how it compares to other media under investigation. The analysis leads to a general conclusion as to the effectiveness of VW technology in enhancing the quality of LL, and helps in generating a set of recommendations to move forward in this area of research.

6.3   Study-1 Technical Requirements

In what follows the main technical items that were required to support Study-1 are described. A classroom, two Video Conferencing (VC) facilities, a computer lab equipped with 30 computers with access to the servers of the Virtual World (VW) Second Life (SL), a SL island setup for delivering the classes, video and audio equipment setup as in a distributed TV studio, along with pre-study testing,

administrative and technical support by the University of Nottingham Learning Sciences Research Institute (LSRI) personnel, is an outline of Study-1 technical requirements. There follows a more detailed articulation for each of these requirements.

6.3.1   Pre-Study Testing

Many systems were involved in the study, spanning the VW environment, the VC system, the storage and retrieval system, the administrative support system, and the technical support system. Although many of these systems were already in place, pre-testing carries many obvious advantages. VW pre-testing had been already taking place in Lebanon. VC tests were also taking place at LSRI labs. Tests on the MLAT were also conducted. These tests prepared the researcher and LSRI personnel to deal with problems that could be faced during running the Study.

6.3.2   Face-to-Face Classroom Facility

This facility was suitable to host a class of around 10 students, allowing a space for 2 or 3 observers as needed, and for a video recording system to tape class activities. A laptop, an LCD projector facility, and an Internet connection were needed for carrying class illustrations and other activities.

6.3.3   Videoconferencing Facilities

Two facilities were required, one for the teacher and one for the students. The audio and video quality were reasonable, within a 6% dropped-packets rate and 300 ms maximum round trip delay typical for inter-continent Internet connections. Features and tools required included laptop/whiteboard image transfer, and having a dual projection of the instructor's video feed and the electronic whiteboard he used. The option to record all VC sessions was required for data analysis especially that the instructor is himself the researcher, and hence would not be able to observe the class activities from outside during the sessions.

6.3.4 Computer Lab Facility

The computer lab was needed to run the CBT Language Aptitude Test (MLAT), and to allow training the participants on the VW, Second Life. The lab needed to hold 26 to 30 desktop computers with headphones and microphones.

Linden Labs, who own and manage the VW SL, publish a set of minimum hardware requirements for running the SL client on a desktop PC. After checking, it was found that the computer lab facility desktops came with the required hardware including suitable graphics cards to support the VW SL. Internet access was available to all PCs, as both the MLAT and SL required access to central servers through the Internet. A 1 Mbps Internet link, with a maximum delay of 150 ms to reach SL servers was available for each of the lab facility desktops.

6.3.5 Second Life Island Access

Access to Second Life VW was made possible from the University of Nottingham's fixed network for the first time on Friday February 1st, 2008, exactly eight months before Study-1 commenced. The UON Information Systems department needed to make sure that periphery firewalls did not limit connectivity between the computer lab facility and Second Life servers.

A SL island with an area of around 18,000 m^2 was required to setup the VW classroom environment. This was necessary to minimize voice interference between users and groups as they practise their language skills. Participants needed to subscribe to a free SL account. The participant SL account list was then forwarded to the University of Nottingham E-learning team to allow them access to the University SL Island, as access was restricted at the time of Study-1.

6.3.6 Virtual Learning Environment (VLE) platform.

Using a VLE platform like WebCT in support of language classes across all three media seemed to be a very appealing option in support of the learning process. The platform was to be used as a class supplement for after-class discussions, assignment delivery, and class notes review, etc.

UON e-learning services were solicited for the purpose of setting up a class through the University WebCT platform, but it was not permissible to use the platform for research at the time. Another option was to use an extension to the open-source VLE Moodle called 'Sloodle' that combines the functionality of Moodle with Second Life, But due to time limitations this option was not pursued by the researcher.

6.3.7 Data Collection and Archiving.

A storage and retrieval system was necessary to archive all class sessions. A video recording and retrieval system was needed for the face-to-face, the video conferencing, and the VW classrooms. The system was pre-tested, including video and audio capture in real life, from the VC system, and in-world. Video feeds from different sources were mixed on the same screen where they were recorded. A digital system was utilized for storage and retrieval of recorded data, and backup DVDs were generated and archived.

6.3.8 Administrative and Technical Support.

LSRI carries excellent support facilities, with administrative and technical support systems that have proved highly reliable and efficient during the Pilot Study. It was helpful to clearly define Study-1 support requirements and possible work-around measures for problematic scenarios. Proper contingency planning was necessary in order to avoid surprises. Alternative labs for running the study were discussed, and relevant reservations were made.

There were some costs associated with Study-1. These included the MLAT software license for 30 seats with a cost of around 300 pounds, and around 40,000 Linden dollars, the VW currency needed for building the learning spaces in SL, equivalent to around 100 pounds. Study-1 budget was around 400 pounds and was handled through LSRI administration.

6.4   Study-1 Description

6.4.1   Recruitment of Participants

The UON School of Politics and International Relations had over 1000 students studying a number of topics. During the Pilot Study, several interviews were conducted with post graduate-level students from the School, and it was obvious that learning the Arabic language is viewed by these students as a big advantage for them in terms of job placement and career build-up. During the Spring-2008 semester, the main PhD project supervisor made contact with the School of Politics and International Relations and with the Department of Modern Languages at the University of Nottingham, to advertise a complementary Lebanese-Arabic language class to students, after which an announcement was made through the School of Politics and International Relations Summer-2008 newsletter that was distributed to all newcomers to the MA degrees. On September 22nd, 2008 a presentation was delivered by the PhD researcher to a large group of students at the School.

Flyers announcing the course were posted in the Student Union Building, and an email announcement was circulated to students who previously participated in experiments at the Learning Sciences Research Institute (LSRI) where the research was based. An announcement was also posted at the LSRI website. 30 participants were recruited and signed a 'Participation Expression of Interest Form', (Appendix 6.2).

A Pre-Study Attitude Survey question on how participants learned about the course, yielded the following results on how participants were recruited. Eleven said through the flyers, six said through the email announcement, three through the September 22nd presentation at the University of Nottingham School of Politics, three through friends, and two through the LSRI website announcement. The eleven who learned about the course through flyers could be split between the public flyers around campus and those who received the summer newsletter from the School of Politics and International relations, as no entry was included for this newsletter in the Survey.

6.4.2   Background of Participants

Out of the 30 participants that were recruited for the study and who attended the first introductory session and took the MLAT test, there were 21 females and nine males. They included three faculty and staff members, one alumni, five BSc students, four PhD students, and 17 MSc students.

Out of the 30 participants who sat for the MLAT test, 24 students went on to the second session and filled a participant-background questionnaire (Appendix 6.7) and a Pre-Study Attitude Survey. Based on that questionnaire, the following facts were determined about Study-1 Participants.

Half of the participants came from the School of Politics, and the other half distributed across the departments of Modern Languages and Cultural Studies, the Learning Sciences Research Institute (LSRI), a Business School faculty member, and a Library staff member. Five students were studying at the BA/BSc level, twelve students were at the MSc level, and three were working on their PhD. One participant was a PhD holder, and one was a MA/MSc holder. Two of them did not report their degrees.

Nineteen participants were close in age, between 20 and 29 years old, and five

participants were over 30 years old. There were 14 female participants and ten male participants. 16 participants had no prior exposure to the Arabic language. Seven of them only knew a few Arabic words. Two participants were able to write and speak a few sentences in Arabic and were allocated to the face-to-face and videoconferencing groups.

Part of the questionnaire tackled participant language background. The responses showed that all students had been exposed to a foreign language at school. On their motivation to learn the Arabic language, 13 said they enjoyed language learning, 16 said 'to better understand the Arab culture and to better communicate with Arabs', and nine said that language learning could enhance their career prospects.

6.4.3 Research Ethics Requirements

Both the Main PhD supervisor and the PhD researcher signed an extended document of 22 statements titled 'School of Education - Statement of Research Ethics'. In compliance with applicable UK standards, the document required that all participants were over 16 years of age, were well aware of the Study and their right to withdraw at any time, and that their participation in the Study involved no risk to them.

For a language class, conducting ethically-compliant research was not a major issue. During the course introductory session students were well informed about the course. They were all handed out the 'Information Sheet for Participants' (Appendix 6.3), and the 'Participant Consent Form' (Appendix 6.4) which they all read and signed.

The 'Participant Consent Form' contained the following statement on ethical conduct during the research study. "This research process shall abide by ethical principles and guidelines for conducting research at the School of Education in the University of Nottingham, which are in accordance with the British Psychological Society Code of Conduct, Ethical Principles & Guidelines (2001) pages 9-14, section on Ethical

Principles for Conducting Research with Human Participants, and which are also in accordance with the Revised Ethical Guidelines for Educational Research (2004), pages 1-13, of the British Educational Research Association." (Appendix 6.4).

6.4.4 The Modern Language Aptitude Test (MLAT)

The MLAT test was delivered in early October 2008 at the University of Nottingham Jubilee campus to 30 University of Nottingham students, alumni, faculty, and staff members. The one-hour test was delivered in British English through a computer-based test program (CBT). Based on test results, Study-1 participants who pursued the study were allocated to three homogeneous groups which had similar language aptitude. The similarity between the three groups was achieved in group MLAT score averages and group MLAT score variances. Besides group allocation data, other information was extracted from the MLAT test results. This information is detailed in section 6.5.1 of this chapter.

6.4.5 Group Allocation Process

The group allocation process was not straightforward by any measure. The criteria for participant allocation across groups were demanding, and with the Study being conducted at the start of the academic year, participant schedules were tight, and classroom and lab reservations were tricky.

After the students conducted the MLAT test, participant test scores were listed in descending order, from the highest score to the lowest. The participant with the highest score was allocated to group one, the second to group two, and the third score to group three. The fourth score was then allocated to group one, the following to group two, and the following to group three, until all participants were allocated to one of three groups.

This allocation procedure ensured uniform distribution of participants across the three

groups, so that the groups would have similar MLAT test score averages. The allocation Similarity was also achieved in the spread of participants with similar language aptitude across groups. When a participant dropped, this method was the most suited to maintain similarity in language aptitude across groups.

Problems were faced while matching the allocation procedure described above with other allocation criteria, such as participants' time schedules, and their personal preferences for a media of instruction. Two participants for example requested to be moved to the face-to-face group after taking the VW class. One of them said the schedule was not suitable.

As participants were volunteers, with the right to withdraw from the research at any moment with no obligations, a delicate balance had to be made in order to retain these participants while meeting the Study design criteria. The final participant allocation reflected this balance, and produced three groups similar in language aptitude scores, while keeping participants happy about their group allocation.

6.4.6 The Instructor

All language classes were delivered by the PhD researcher Riad Saba, a native speaker of Lebanese Arabic who, as of September 2008, has had 13 years of university-level teaching experience in the areas of Engineering and Sciences at the University of Balamand, a leading University in his home country Lebanon.

The researcher is a native speaker of Lebanese Arabic, and his ability to deliver the course was commended by students who sat for the Pilot Study classes, as evident from the post-study attitude survey. The successful delivery of Pilot Study classes has well positioned him to deliver Study-1 classes.

Budgetary constraints did not allow hiring a professional Arabic language instructor

in any case, so by convenience, he was most suitable for the role. From another angle, it was for the best that the researcher delivered the classes in order to get more direct insight into class attitudes towards the media being used. One scenario that might need to be provided for was a back-up instructor in case the instructor got ill or had to return to Lebanon during Study-1. This was not needed however, and Study-1 was conducted under the same instructor.

6.4.7   Media of Instruction

The three media used were a face-to-face classroom, a videoconferencing (VC) class, and a Virtual World (VW) class. All media were based in the LSRI facilities at the University of Nottingham-Jubilee campus. Video and audio was recorded for all classes delivered through the three media used.

The face-to-face classes were conducted at the Flexible Learning Room (FLR). The FLR room was equipped with three cameras and six microphones around the room, two large-screen interactive whiteboards in the front and one in the back, and had movable chairs and tables, allowing room adaptability to several learning scenarios (see figure 6.1). During a face-to-face class, a video of the students, a video of the instructor, and a video of the instructor's computer that was projected to students were mixed on one screen for recording (See figure 6.2). The instructor was able to write free-handed on an interactive whiteboard in front of his students (see figure 6.3).

The VC classes were conducted between the FLR and the Usability lab across the hall. Both the instructor and the participant views were fed to the same video recording screen along with the instructor's laptop view (see figure 6.4). During a VC class, the instructor was able to write free-hand on a tablet screen which was projected to students on a large screen in the FLR where they sat (see figure 6.5, bottom right).

For the VW classes, the instructor was based at a central location in LSRI labs while

students were distributed in three different rooms in the labs. Both in-world and live video and audio feeds were mixed onto a single quad video recording screen (see figure 6.7).

Figure 6.1   The Flexible Learning Room (FLR), part of the LSRI labs, where the face-to-face classes were held

6.4.8 The Classes

Six Lebanese Arabic Language classes were delivered through each medium on a weekly basis between October and November 2008. Study-1 Time Table (Appendix 6.1) lists the weeks when classes were delivered along with a list of the various activities that took place during each week. The one-hour language classes covered only spoken language, as writing in the Arabic language required a long time to learn and was outside the time scope of the Study. The main focus was to understand and to speak the Arabic language as spoken in Lebanon, as this dialect is understood by most other Arabic-speaking countries. Despite the fact that using Arabic letters would have been more useful for students on the long run, Latin numerals were used to write the Arabic words, to accommodate the short-term learning process.
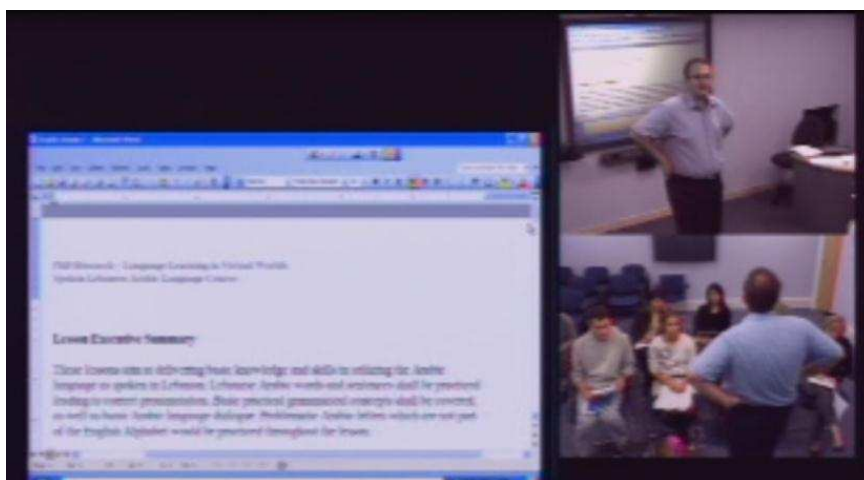
Figure 6.2 A face-to-face classroom being held at the Flexible Learning Room (FLR). The recorded video included a view of the instructor (top right), the students (bottom right), and one of the two interactive whiteboards (left).

Face-to-face classes were held at the FLR. The interactive whiteboards at the FLR allowed the instructor to write free-handed on the screen in front of the students. Arabic words were written as they sounded in English. The Arabic word for 'Hello' for example was written as Marĥaba.
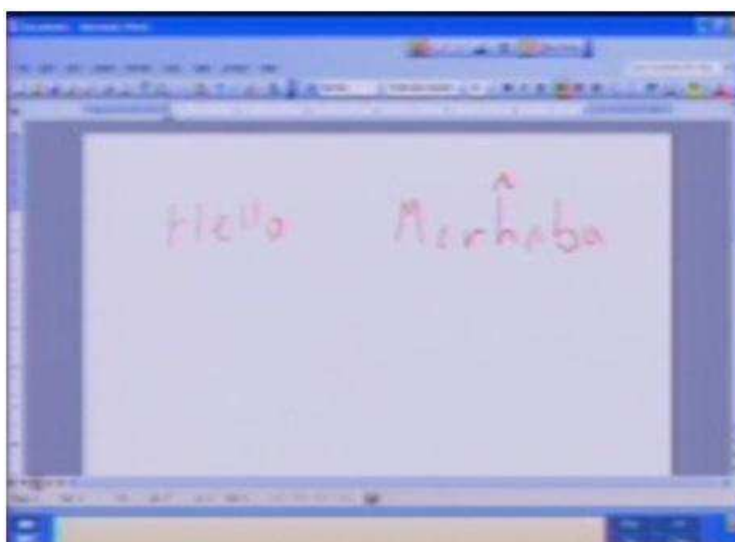
Figure 6.3 An interactive whiteboard at the Flexible Learning Room (FLR) allowed the instructor to write the Arabic word as it sounded in English. The word for 'Hello' is 'Merĥaba' in Arabic.

Videoconferencing classes were held between the Flexible Learning Room (FLR) where the students sat and the Usability lab where the instructor sat. A video feed of the instructor's face was projected to students on one large FLR screen, and the instructor's tablet computer screen on which he was able to write free-handed was projected on another large screen in front of students at the FLR. The VC classes were recorded for later reference.

Problems were faced half-way during the first VC class on 8-10-2008 leading to its completion face-to-face. Although the LSRI staff tried to resolve the technical issues, the problems persisted through the second VC class held on 15-10-2008 and it was also delivered face-to-face. The problems were later resolved and the remaining four classes were delivered through VC, but three participants out of six dropped from the class after the 15-10-2008 class. The problems were not due to the VC system (coder-decoder or codec) since it was possible to connect them directly with external VC facilities across the Internet. They were attributed to a computerized switching and recording system at LSRI labs that was being programmed at the time of the study.

Figure 6.4   A VC class being held between the Flexible Learning Room (FLR) (left) where the students sat, and the Usability lab (top right) where the instructor sat. The instructor's tablet computer screen is seen on the bottom right.

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Figure 6.5   During a VC class, the instructor was able to write
free-hand on a tablet screen (bottom right) which was projected to
students on a large screen in the FLR where they sat.

For VW classes, a short briefing session was held between the instructor and the students before the classes started, then the students were spread across the LSRI labs where they sat behind laptops or desktops with the SL VW client installed, and were given a set of headphones to use duing the class.

Participants were then assisted by the instructor and LSRI staff to logon to SL, teleport to the University of Nottingham island, and locate the Arabic laguage class. They were then helped to optimize the sound settings on their SL clients in order to communicate with the instructor and with other participants.

Centrally located within LSRI labs, the instructor delivered the classes through the VW interface where he took count of students, making sure that all were able to find the class and communicate with others (see figure 6.6).

Figure 6.6   The instructor, researcher Riad Saba delivering a class through the Virtual World Second Life

Recording VW classes was necessary in order to carry out later analysis using the critical incident technique. The recording was however tricky. There were up to six participants and an instructor sitting behind computers in a given VW class. In parallel, there were seven perspectives within the VW. It was obviously neither possible to record all 14 views in parallel nor practical to review them later.

The recording system at the LSRI labs allowed for four video/audio inputs. Two real-life video/audio feeds and another two from within the Virtual World classroom were recorded simultaneously on a quad-video screen (see figure 6.7). The real-life feeds were selected from participant desks in order to observe their reactions while learning. One of the VW views was that of the instructor and the other was that of a participant. As the instructor delivered classes, his voice as well as the VW class view in front was recorded. A student in real life and his VW view was recorded including voice interactions.

Figure 6.7   The recording screen during a VW class. There were four video/audio inputs, two from participant locations (top), and two from within the Virtual World classroom (bottom). One of the VW views was that of the instructor (bottom left), and the other was that of a participant (bottom right).

The following is an account of a VW class. During the first few minutes of a VW class, the instructor held a face-to-face briefing session with participants instructing them on what to expect during the VW class and handed out the lesson to be delivered on paper. The participants and the instructor then spread across LSRI labs where they prepared to join VW class activities.

After talking with each of the students to make sure they were ready for the class, the instructor delivered a 20-minute presentation of the lesson material. Activities included going through class notes and practicing the material with the students (see figure 6.8).

Figure 6.8   Instructor notes were projected in front of students on a large screen (right) and were also available to students as hard copies.

When the interactive session was over, the instructor advised students to practice the material just delivered with other participants. The instructor invoked a program that moved participants sitting in their chairs within the normal classroom setup into pairs dispersed across a large area, in order to carry out practice conversations quietly (see figure 6.9). The instructor was also able to move participants instantly into a large circle to carry out briefing meetings (see figure 6.10). To be able to do that however, participants had to be sitting in their chairs.

Figure 6.9   Pairs of students practicing what was learned during the interactive session

Figure 6.10   The instructor was able to move participants sitting in their chairs into a large gathering circle in order to carry a group briefing meeting.

After about five minutes, the instructor brought back the participant pairs to the central class location to deliver another class activity. When three activities were completed, the instructor asked participants to find practice boards where they reviewed what was learned. Each participant using one practice board would go over an activity like learning numbers by pressing on a button to hear the word pronounced in English then in Arabic. Students repeated pressing the button as many times as needed (see figure 6.11).
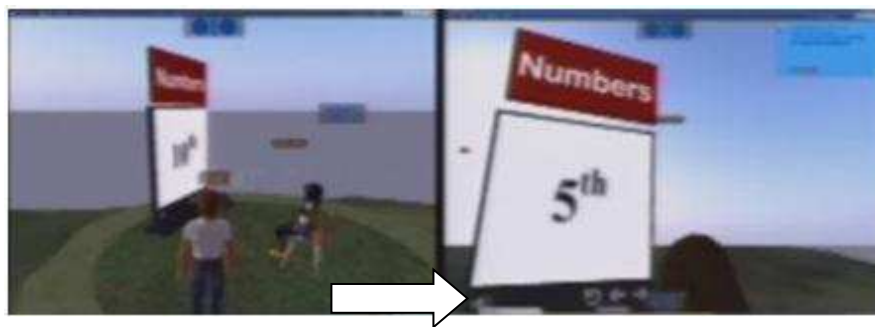
Figure 6.11   Participants practicing what they learned during the interactive VW sessions. The arrow is pointing to the sound button that plays the English and Arabic words for the English word on the image.

The practice boards had to be dispersed over a large geographic area in Second Life so that 3D voice would not overlap and each participant would have the quiet time needed to review and practice what was learned (see figure 6.12).

Figure 6.12   The practice boards dispersed over a large geographic area in Second Life for no 3D voice overlap

One session involved a role-play activity where a photo of the required setting, like a hotel for example, was projected on a large screen. Participants would take suitable positions around the stage according to the role they are playing for review and practice (see figure 6.13).

Figure 6.13   The role-play area

6.4.9   Class Attendance Issues

Class attendance had been a major issue to deal with throughout the Study. Out of the 30 participants that sat for the MLAT test, six never showed up again. Out of the 24 students who started attending the lessons, only ten completed them and sat for the final assessment.

It was not clear why the six participants did not pursue the study. They were contacted by email to give them the MLAT test results and to ask them if they wished to pursue the study, but they would either say their time was fully occupied or they did not answer. Two of the six that dropped out after taking the MLAT did not spend the time to take the MLAT and went very quickly through it. This suggested that they were not serious about the study.

One student suggested after taking the MLAT that they would like to join the VW class from home, but this was not possible as it would have deprived him from the briefing sessions and would have deprived the research data from his response to interview questions and final assessment.

Out of the six there were five MSc students. It is known that a one-year MSc degree in the UK is quite demanding on student time, so perhaps these five participants felt they could not commit to a two-month study while pursuing their MSc degree, but this is only a speculation since no other data was available from them or about them.

The face-to-face class that was held Wednesdays at 2 PM suffered five dropouts out of the ten starting participants. One participant missed the first two sessions due to travel. The dropout was gradual as compared to the two other media which suffered sudden dropouts. The face-to-face class attendance data is found below.

Name/Date	1-10	8-10	15-10	22-10	29-10	12 -11	19-11	Remarks
F-to-F St 1	√	√		√	√			Make-up
F-to-F St 2	√	√	√	√	√	√	√	
F-to-F St 3	√	√	√	√	√	√	√	
F-to-F St 4	√	√	√	√		√	√	
F-to-F St 5	√	√	√	√	√	√	√	
F-to-F St 6			√	√		√		D
F-to-F St 7	√	√	√	√				D
F-to-F St 8			√					D
F-to-F St 9	√	√						D
F-to-F St 10	√	√						D

Table 6.1   Face-to-face class attendance data

The probability that the dropout was due to participant mounting workload as the semester progressed was thus higher than that for the dropout in the two other media. Two of the dropouts from the face-to-face class were associated with the LSRI. One was a PhD student and the other was a research fellow. The research fellow apologized from attending due to travel engagements.

Participants of the videoconferencing class took the MLAT on October 1st. The class was then held on Wednesdays at 3:30 PM. The first class session held on October 8th suffered technical problems half-way through the lessons and prevented completing it via VC and so it was completed face-to-face. The second class session was held face-to-face since the VC issue was not sorted out yet.

While the problematic sessions were attended by six participants, only two showed up for the third class session on October 22nd. After writing to the participants who dropped out, each had an excuse of mounting work-loads. It could be deduced however from the sudden drop in attendance that the technical problems had some part of their decision to drop out.

Name/Date	1-10	8-10	15-10	22-10	29-10	12-11	26-11	Remarks
VC St 1		√	√	√	√	√	√	Conducted assessment via phone and email
VC St 2	√	√	√					To one-on-one makeup lessons
VC St 3	√	√	√		√	√	√	
VC St 4	√	√		√	√		√	
VC St 5	√	√	√					D
VC St 6	√		√					D
VC St 7	√	√	√					D

Table 6.2   Videoconferencing Class attendance data

A similar sudden drop in attendance was experienced in the VW class which was held on Fridays at 2 PM. This dropout took place after the third session that was held on October 24th. Voice problems were very annoying during that session. SL 3D voice did not function as it should. Student conversations were heard far from where they sat in pairs practicing what they have learned. Practice boards suffered non-uniform sound levels as the same sound file played at different volumes on different boards programmed the exact same way. One participant had no voice available even with all the right settings.

When students who missed classes were contacted they had different reasons for missing classes. One participant gave the excuse that the source of funding from the US stopped due to the credit crunch that took place during the time of the study, and that she had to work extra in order to make more money to compensate. Another participant said that he had to travel and could not make it for class.

Name/Date	1-10	10-10	17-10	24-10	31-10	14-11	18-11	21-11	Remarks
VW St 1		√	√	√	√	√	√	√	
VW St 2	√	√	√	√	√	√	√	√	
VW St 3	√	√	√	√					D
VW St 4	√	√	√	√					D
VW St 5			√*	√					D
VW St 6			√*						D
VW St 7	√	√							D

Table 6.3   Virtual World Class Attendance Data

Besides the factor of dissatisfaction with problems in the technical setup, one of the possible factors that caused dropouts across all three media was the mounting academic workload. A review week that was in early November was approaching. This is a week during which several participants who were University students reviewed for exams. This is why no Study-1 classes were held during the first week of November.

All the students who dropped were contacted by email later during the year to explain why they have dropped, what they thought of the class, and what could have been done in a better way, but none replied.

6.4.10 The Assessment

An assessment was conducted at the end of the course. The goal was to assess learning outcomes of students in each group, so as to have a feel of the effectiveness of the media through which the group was taking the classes.

The course assessment (Appendix 6.12) was written to measure learned vocabulary, pronunciation and sentence structure, as well as the ability to use these skills in practical situations. The assessment was divided into three parts, sentence translation,

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pronunciation, and role play activities. The sentence translation was written, while the pronunciation and role play parts were verbal. All participants in each group took the written part at the same time. The verbal parts were then conducted one participant at a time, while the other participants waited outside the classroom. Although it would have been beneficial, it was not possible to recruit another Arabic language teacher to join the grading process.

The instructor instantly graded the assessments and gave the scores to participants. The same grading scheme was applied by the instructor to make sure that the grading was uniform across the three groups. Participant mistakes were graded appropriately so as to avoid floor or ceiling effects, so as to be able to compare between the group results. Assessment score-sheets for each medium are included as Appendix 6.9.

6.5   Study-1 Results

6.5.1   MLAT Results

For the 30 participants who took the test, the mean score was 65%, and the standard deviation was 28.67. Although the sample of participants was small, the results are in line with common sense and with similar previous research described in section 6.4.4. Below are the results along with a possible logical interpretation where applicable.

The mean score of 27 students between 20 and 31 years of age was 65.7%, while the mean score of 3 students between 42 and 59 years of age was 57.6%. Age could be a factor in language aptitude. The older participants scored 7% lower than the class average while the younger participants scored 1% higher than the class average.

The counter-argument could also be true. According to John Carroll, language learning aptitude is relatively stable over an individual's lifetime (Carroll, 1962). The difference found above could be related to the older participants' modest PC skills.

One older participant noted that her modest PC skills prevented her from doing her best on the Computer Based Test (CBT). Computer skills are a factor to consider for such activities, and a thorough orientation could be instrumental for a fair assessment.

The mean score of 19 native speakers of British English was 70.5%. The mean score of 11 non-native speakers of British English was 55.4%. Since the test was delivered in British English, native speakers of this language were at an obvious advantage over non-native speakers.

MLAT Scores correlated with the participant language background. The MLAT mean score of two students who spoke one language was 50.3%. The MLAT mean score of eleven students who spoke two languages was 60.9%. The MLAT mean score of eight students who spoke three languages was 64.7%. and the MLAT mean score of nine students who spoke four or more language was 70.89%. This suggests that participants with 'lower' second language education are at a disadvantage when compared to those with 'higher' second language education. Further statistical tests would be however required to prove this conclusion.

The MLAT scores correlated with the participants' major. The mean score of four Language and Linguistics students was 71.6%, while the mean score of all other 26 participants was 63.9%. This result is logical as these students are skilled in foreign language acquisition and in the dynamics of language learning.

One participant noted that his first language was Chinese, an image-based language, and that this makes it harder for him to learn another language which is based on letters and words. He scored two points below the class average.

Two participants went quickly through the exam without taking much time to think their answers through. They were obviously not motivated to take the test and they quickly quit the course thereafter.

The MLAT does not measure motivation. A student with a high motivation level and a low MLAT score might learn a foreign language better than a student with low motivation and a high MLAT score. Accordingly, proper use of the MLAT would be to use it as one part of a more comprehensive assessment of the learner, or use the test in a setting where motivation is known to be uniformly high.

In response to this issue, the Pimsleur Language Aptitude Battery (PLAB) (Pimsleur, 1966) was developed to include a section that assesses motivation in examinees. This test was not applied in Study-1 since all students were volunteers, and since they were interested in adding Arabic to their portfolio, so it was assumed that motivation was high among the majority of Study-1 participants.

The participant level of study (BSc, MSc or PhD) could make a difference on MLAT scores. Student educational level, age, language background, and other factors would have to be considered in correlation, but this was outside the scope of Study-1.

Looking at an individual's score on the different parts of the test can be used to match students' learning styles with instructional approaches. It can also assist participants by showing which learning strategies that they use best. This was also outside the scope of Study-1.

Student performance on the final class assessment partially matched their performance on the MLAT. However this result does not diminish the predictive validity of the test. This validity was established in quantitative studies like that conducted over 1000 foreign-language students, and showed strong correlation

between the MLAT results and the end-of-training proficiency outcomes, using both the results of individual test parts and total scores (Ehrman, 1994).

6.5.2 Pre-Study Attitude Survey Results

The responses of 24 participants to the Pre-Study Attitude Survey were filed. The results are summarized below. Section I: Attitudes Towards Language Learning. The statements in this section centred about participant opinions about language learning and its importance. Students were asked about the extent they agreed or disagreed with statements about language learning by circling one of five possible responses.

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
1. For me, learning another language is easy.	3	5	9	7	
2. A second language is part of an educated person's profile.	11	8	1	3	1
3. Learning another language is best done with native speakers while I am visiting their country.	11	10	2	1	
4. Learning another language would help me understand its culture better.	10	12	1	1	
5. If I travel to another country I find it important to learn its language because this would allow me to relate to its native speakers in a better way.	9	13	2		
6. Business today is global, but English is enough to do business globally.		7	5	10	2
7. I only like to learn a few basic words and phrases of another language without necessarily reaching an advanced stage.	1	1		11	9
8. Overall I think it is important to learn another language.	15	9			
9. I prefer to learn a new language on my own, without the help of a teacher.			4	14	6

Table 6.4   Pre-Study Survey Results – Section I

Section II: Attitudes Towards Educational Technology and Media of Learning. The question was: To what extent do you agree or disagree with each of the following

statements about Educational Technology? (*Circle one attitude for each statement.*)

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
1. I have taken classes through educational technology before. If you did take such a class, through which medium?	2	4	1	12	4
2. Technology allows reserved learners to express themselves more freely and hence better engage in the learning process.	1	6	13	2	1
3. A face-to-face classroom is more effective than a remote classroom using technology.	6	8	9	1	
4. Technology limits direct interactions with the teacher	3	11	9		
5. I prefer to take language classes through a face-to-face classroom. If so, why ?	11	9	2	2	
6. I like to explore a new medium of learning regardless of learning outcomes	3	9	6	6	
7. I am comfortable working with educational technology like e-learning.	1	8	13	2	
8. Technology allows more flexibility for learning anytime, any- where. If so, could you give an example or two?	3	17	2	1	
9. I often play computer video games.	2	1		13	8
10. Some computer video games could be educational.	2	16	6		
11. What is the most effective technology tool that you experienced while learning?	Language tapes-dictionary -facetoface2 –internet –dictaphone-videoconferencing-TV-word processor - CD player				

Table 6.4   Pre-Study Survey Results – Section II

As a summary, Study-1 participants were a highly educated group that believed in the importance of learning a new language, for social and career implications. They wanted to learn more than a few sentences of a foreign language, and they did not want to learn on their own. Most participants believed educational technology limits direct interaction with the teacher and preferred to learn through a face-to-face

classroom. Only few of them have been exposed to educational technology, so the group was sceptical about its effectiveness in language learning. Most agreed however that it allows for flexibility in learning anytime, anywhere.

6.5.3 Post-Study Attitude Survey Results

The three groups of participants who completed the course filled in the post-study attitude surveys independently. The participants who completed the survey were distributed as follows: five from the face-to-face group, three from the VC group, and two from the VW group. Results were tabulated for each of the Face-to-Face, VC, and VW groups, and are included as Appendices 6.12, 6.13, and 6.14 respectively. A separate discussion is made for each statement in the survey, showing the how the different groups responded to the statement, and making corresponding conclusions where applicable.

For the first statement on how easy it is to learn new languages, one participant who strongly agreed indicated that she was studying languages, and so it is easy for her to apply the same principles and learning techniques to another language. Another participant who agreed found certain areas were easier to learn and remember, such as practical applications and food. Two participants who were neutral commented that a European language that is close to their mother tongue would be easier to learn. One participant commented that age is an important factor as it was much easier to learn when she was younger. Another comment was:

> *"It depends a bit on the language and how I'm learning it. To learn English wasn't too hard as I was living in England. To learn Italian (despite being at advantage because it's got similarities with my mother tongue) was harder because I wasn't living in Italy".*

She added that it was challenging to learn Arabic mainly because of pronunciation.

Statement 2 was 'Learning another language is best done with native speakers.' One participant who agreed indicated that it is best to learn the basics before travelling. Two participants who strongly agreed indicated that when one constantly hears, reads, and speaks another language and can apply knowledge in an authentic situation, one learns quickly and easily. One participant commented that while this statement is true, it is not always possible.

Statement 3 was related to the level desired to be reached in learning languages. Participants commented that the level to reach depends on the language, the need, interest, ease or learning, career relevance, and on the widespread use of the language. One commented that learning another language is very useful and must be done thoroughly. Few participants wanted only the minimum to get by, one of which commented that only few phrases of the new language is needed to communicate with locals when on vacation.

Statement 4 was 'I prefer to learn a new language on my own, without the help of a teacher.' All Participants wanted to learn with a teacher. They commented that a teacher is vital for guidance, introduction to culture, checking pronunciation, correcting grammatical errors, motivation, etc.

On the role of language in understanding culture, one participant commented that if one knows a language it would be easier to mix with the locals and thus learn the culture. Another participant commented:

> *"you always inevitably gain better understanding of the culture by learning its language".*

In response to statement 6, most participants found that learning Arabic had been

more challenging than learning other languages. They indicated that Arabic has a particular alphabet and that spelling and pronunciation posed a problem. One participant responded that with 22 different dialects, different transliteration protocols and written forms, it becomes interesting (meaning difficult).

In response to statement 7, most participants agreed that learning Arabic requires dedication and time that they were not able to allocate. One commented:

"Yes, thanks to Riad who worked hard to help me learn. I do wish that I could have committed more time to the learning process".

As for statement 8, all participants indicated that they enjoyed learning the Arabic language. A general comment was,

"Overall, I really enjoyed the course, Thanks Riad!"

Statement 9 was 'I do not feel comfortable using the newly acquired Arabic language skills.' Most respondents were somewhat comfortable with their newly acquired language skills. One participant stated that she would not enter into Arabic conversations, but pleasantries and basic phrases she would venture.

Statements 10 to 13 dealt with how appropriate the Arabic language class material was in form and structure, content and delivery rate, and how suitable the teacher and the classroom were for language class delivery. Most participants agreed that the Arabic language class material was appropriate in content and delivery rate. Some participants suggested to include translation and grammar homework, and to focus more on grammatical content and keywords such as 'and, or, either, with, etc'. One participant commented,

"I especially liked the later lesson where we started to team to form sentences and then have it applied to a practical setting".

Participants were split on the Arabic language classroom suitability for class delivery. One commented that tables were needed along with the chairs. Another commented that out of two classes attended, one suffered a technology failure, and so the classroom was not fit for purpose.

Most participants agreed that the instructor was suitable for the course. One commented,

"Riad worked really hard to help me learn and was obviously eager for everyone to succeed".

One participant who was a student in languages commented:

"Although Riad is a native Arabic speaker, he has never trained as a language teacher, which I feel is necessary".

Statement 14 was 'I would like to pursue learning the Arabic language further.' Most participants expressed interest in pursuing learning the Arabic language. One expressed intent to practice Arabic when on vacation in an Arabic-speaking country. Another realized that it required time to study independently. Two expressed interest in learning Arabic again when spare time is available. A third participant commented,

"I like to learn how to write it as well and increase my ability in the language".

One general comment on this section was that it would have been useful if the lessons

were available in audio-recorded format such as MP3, so that they could be reviewed while driving or while doing other things.

Section 2 of the survey contained statements and was devoted to get student feedback on the comparison between different media that they experienced in learning. It was only filled by participants in the VC and VW groups since the face-to-face group did not experience either medium to be able to comment.

Based on their comments below the survey statements, participants in the VC class did not feel there was a big difference between face-to-face and VC media for learning. They thought that VC technology did not limit direct interactions with the teacher, as speaking and listening were comprehensible. The VW group however had another opinion as they felt the VW medium limited direct interactions with the teacher.

Statement 3 was, 'I prefer to take language classes through a face-to-face classroom. If you agree, could you please explain?' Participants in VC classes commented that they prefer direct social interaction with the teacher and with other participants, but that was already available as the teacher met the participants face-to-face before and after the classes, during which the participants were collocated in the same room.

The VW group was split on Statement 3. One preferred face-to-face classes and another preferred VWs. One participant in the VW group preferred face-to-face over the VW because she felt that much time was spent focusing on the attitude surveys and novelty than on Arabic.

All VC-group participants were comfortable learning with educational technology like VC. One said that it was better than he/she thought it would be. A VW-group participant who was comfortable learning with educational technology like VWs said

that it was not much of a leap from conventional methods – vocabulary, exercise, practice.

Participants agreed with Statement 6 that VC and VW technologies allow more flexibility for learning anytime, anywhere. They commented that VC allows for flexibility in scheduling over the face-to-face media, otherwise they are similar. One participant commented,

> *"The statement may be true, but the student would have to be very self-motivated. I'm not".*

Participants in the VW group were not sure that VW-based classes allowed reserved learners to express themselves more freely and hence better engage in the learning process. One commented "Probably", so obviously this was not her own personal experience. The other commented,

> *"Not sure as I did not feel I am in my avatar's shoes".*

To the open-ended question, 'What is the most effective technology tool that you have experienced throughout your education?', one answered that it was the interactive whiteboard with broadcast. Another said that technology limits interactions with the teacher, which is harmful to the learning process. A third comment was,

> *"I like when videos are incorporated in the classroom as an aid (not the teaching means but to aid teaching especially a particular thing). CDs and headphones are helpful to practise listening and pronunciation".*

One VW-group participant commented that the VW practice boards were very useful. She also liked that charts that connect all what they learned, both as a visual aid and

as a tool to show how learning interconnects – charts on all tenses in a language for example.

As a general comment on Section two, one participant wrote,

"I don't know if video conferencing improved my learning skills, but I didn't dislike it as I thought I would. Maybe that's because we saw our teacher face-to-face before and after, and there were classmates to interact with. I found it hard sometimes to get the pronunciation right because the screen is not as clear as face-to-face interaction and when I'm learning new sounds I like to look at the teacher and see what shapes the lips form for that particular sound, it helps me to copy it".

One participant in the VW class commented on the difficulty of learning Arabic,

"I now realize it depends on how close the language is to others I'm familiar with and can pronounce".

As a general conclusion to this section, while there were divided opinions on some issues, it was obvious in survey responses that the VC group felt more comfortable in taking the VC classes than the VW group did through VWs. According to Study-1 participants, and while both classes were completed successfully, the VW experience was not as positive as was the VC experience in delivering the language class.

6.5.4   Final Class Assessment Results (Appendix 6.9)

All students passed the assessment and received a certificate of completion (Appendix 6.10). The lowest grade was 71% and the highest was 86%. As far as group averages, the face-to-face group scored a mean grade of 78.4% on the final assessment, while the VC group mean was 80.3%, and the VW group mean was the highest, at 82.5%.

The low number of participants that underwent the final class assessment does not allow for a quantitative conclusion as to which is the most effective medium based only on the assessment results. Many factors undermine the representation of these results of the effectiveness of the media being used. These factors include the language aptitude of the participants, the number of sessions attended, participant study time, motivation, background, assessment coverage of content, assessment grade validity, assessor objectivity, and the long time given for participants to learn the material.

The results however serve to show a relative similarity in media learning outcomes with around 4% as the highest difference in group averages. The similarity in the assessment results across the three media goes to say that the VC and VW media carry the potential of delivering effective teaching as the traditional face-to-face media.

6.5.5   Interview Results

An Informal interview was conducted with each group of participants at the end of the course. The participants were asked questions about the most successful and least successful events, issues, or activities during the course. Participant responses were written down by the researcher as notes during the interview time, and were later used to write the results below.

Participants responded that among the most successful issues for the face-to-face group was the practice of pronunciation, the handouts being available, individual attention given to students by the instructor, as well as learning from other students, and applying what was learned through role-play activities.

As for the least successful issues for the face-to-face group, a participant commented that since some pickup the material quicker than others, group allocation was not

suitable. Another found deficiency in the grammar and verb conjugation. Two participants noted the absence of tools that connect sentences like 'and', 'or', 'but'. One participant commented that the role-play scenarios were quick and should have been taken in steps.

The most successful issues for the VC group came as follows. A participant found that video was similar to face-to-face, yet it was more informal and more relaxing. Another commented that self-paced learning and the projection of notes on the screen were useful. Another participant commented that pronunciation practice, vocabulary and pronouns given were all very useful.

As for the least successful issues for the VC group, one student noted spelling and listening difficulties, another noted the issue of writing, as students wrote Arabic words in English, a third noted that understanding spoken Arabic was difficult, and a couple noted that more practice was needed.

The interview with the VW group coincided with the time of conducting the post-attitude survey. The most successful issue according to one participant was the panel boards that included course material. The least successful was the long time spent on surveys and research work rather than focusing on learning Arabic.

6.5.6   Critical Incident Analysis Results

The critical incident analysis was conducted as follows. Videotapes of three VW classes were scanned by the researcher for unusual events to identify obvious and informative breakdowns or breakthroughs, and 50 incidents were transcribed and analysed for commonalities, and categorized as breakdowns or breakthroughs with different common themes. Transcripts of these incidents were logged, one incident per page (Appendix 6.11), and then analysed using thematic analysis (Boyatizis, 1998), and categorized according to the nature of the incident (breakdown or breakthrough)

and the type under which it falls which could have been either technical, usage related, activity related, learning activity related, or motivational.

Breakdowns are observable critical incidents where a learner is struggling with the technology, is asking for help, or appears to be labouring under a clear misunderstanding. For breakdowns, the themes were technical failures, with a specification of the type of failure encountered, a VW usage error, an activity-related breakdown or language misunderstanding, a learning activity failure where participants do not understand the required learning task, student fatigue, as well as other incidents which were not very common.

Breakthroughs are observable critical incidents which appear to be initiating productive new forms of learning or important conceptual change (Sharples, 1993). For example, where there is some activity or discussion on the video that indicate a cause or a solution to a learning problem, or that suggests an activity contributed to learning. As for the themes of the breakthroughs category, they included understanding of lesson material, successful completion of task, enjoying Learning, as well as other breakthroughs which were less common.

Incidents may either be predictable, for example where the intervention may be aimed at producing conceptual change, or unpredicted, where a participant uses the technology in novel ways, or makes an unforeseen connection or conceptual leap. A sample transcript template is included as Appendix 6.11.

The analysis of incidents showed commonalities between the incidents, several of which were technical breakdowns. The major problem faced was with voice in SL. Some students always seemed to need help in starting to use voice. A low quality microphone made it heard every time a student breathed. When one student sneezed it flooded the audio channel. Echo was a problem although students were spread across

three rooms. Also 3D voice in SL did not perform as it should.

This was evident in the second class session where participants voices were overlapping although their avatars were far apart in SL, and some students' voices could not be heard at all. There is a high probability that these technical problems have led to a large participant dropout, as only two participants showed up for the following session.

Breakdowns which were related to learning activities included VW usage, where students would get lost while flying between the main assembly area and the practice areas, or would find difficulty in positioning their avatars to see the practice boards clearly. Some participants also had issues understanding the task at hand. There had also been information collected during the analysis of gaps in the learning material, like for example the number 'zero' missing from the numbers table.

There were several breakthroughs in VW classes. Participants generally enjoyed the learning activities that were offered, and were amused at the features of the VW. This was evident from their reactions and interactions. Participants who completed the course were able to learn the required material, and they performed as well as the participants using other media, either in spelling of difficult Arabic letters, or in the acquisition of vocabulary and sentence construction. The practice boards were very useful, and the role-play area was particularity enjoyed by them. Participants also discovered the instant messaging feature in SL, and experimented briefly with it.

As the recorded videos showed only two participants in real life, and one participant's screen in Second Life, it was not possible to analyze what the other students were doing, or what issues they have faced. Post-attitude surveys and interviews were however used to cover this gap. Another limitation for this technique is that the analysis was carried by the researcher with no one else to cross-check results with.

6.6   Recommendations and Further Work

6.6.1   Participant Commitment

The lack of student commitment to complete the classes, especially in the Virtual World group with only two students finishing the classes, has diminished the reliability of the experiment results. Research ethics guidelines clearly state that participants are not obliged to complete the experiment. There should hence be another method to motivate them to do so. The method could potentially be paying for participation provided the participant completes the experiment.

6.6.2   Class Delivery Model

While the parallel model allows for a fair comparison between media, it does not allow participants to each contribute to the comparison since they only examine one medium. The Cross-over model however allows participants to give first-hand feedback since they get to use all media being compared. It would thus be useful to deliver classes using the cross-over model.

6.6.3   Technical Issues

The VC setup at LSRI is not recommended for the future since the issues faced prevented the completion of classes through LSRI labs. The complex recording and switching system was still being setup during the time of the experiment, and many complications came-up, often unpredictable.

Based on the experience of Study-1, it would be helpful to spread participants in VW far apart to avoid voice feedback (echo) from interfering with the learning process. Also a clearer recording scheme would produce better views of what went on during the experiment and would better allow for its analysis. SL servers would have to provide a more consistent 3D voice service for classes to proceed smoothly.

6.6.4 Reliability of Data Analysis

Although this might be restrictive, another grader would be useful to have to allow for a better assessment of learning outcomes. Also having someone observe the class videos would give a more reliable interpretation of the breakdowns and breakthroughs, since the critical incident method is generally a subjective interpretive method, and like any observational method, it is prone to errors.

The critical incident method is however a method for evaluating and designing future technologies within an iterative design framework through cycles of research and development. Hence errors would be certainly discovered and corrected. The critical incident technique is not a method that would lead directly to a learning theory of any description, but rather a method that serves the collection and analysis of useful research data.

6.7   Chapter Summary

This chapter included the design and description of Study-1. The Study involved three language courses delivered in parallel across three media of learning. The objective was to compare between the three media to see how well the VW class aided in the delivery of language learning. After the Study design was explained, a description of classes through each medium showed the kind of issues that were faced. Results of the Study were plotted across several research methods used. Based on the results of these methods a set of recommended improvements was outlined.

In linking Study-1 results to its objectives, it is fairly straightforward to claim that a feel was developed for the opportunities offered by the VW SL as a language class delivery medium. The VW allowed for several learning scenarios. It also allowed a group of students to learn the language lessons and achieve comparable grades as the other groups of students. These results partly confirmed the VW promise in education. Study-1 was also projected to explore the challenges created by the VWs media, and

this objective was also achieved during the Study.

Study-1 was designed to investigate the effectiveness of VW media in LL compared to other methods of whole class teaching, through a comparative analysis between learning media. This objective was not achieved since the validity of the results was limited by a large participant dropout rate.

Study-1 results were however useful in the formulation of a set of recommendations that would serve as a reference in guiding the practical utilization of VWs for LL, serving as a stepping stone for further research work.

Chapter 7

Study-2

7.1   Introduction

7.1.1   Overview

After several issues were faced in Study-1, there was a need to conduct Study-2, building on the experiences of Study-1 and the Pilot Study. Study-2 was run in September-October, 2009. Study-2 justification, design, description, and results are covered in this chapter.

7.1.2   The Need for Study-2

Several issues were faced in Study-1, posing a need for a sequel study-2. The major problem was that of retention. Participants dropped out of the classes, as only 10 out of 30 completed Study-1. Reasons for the dropouts were explained in the previous chapter covering Study-1. This posed a problem since it was not possible to produce useful data with people not showing up to class. It was thus necessary to give participants a strong incentive to complete the new study.

Part of the reasons behind the retention issue was technical. Voice problems plagued the VW medium. These included enabling voice on individual PCs, where sometimes voice worked and sometimes not, and also voice overlap between active voice conversations even when the distance in the VW was large enough for the 3D voice to fade away as it is supposed to. Another issue with VW voice was the amplitude non-uniformity evident in the self-study boards where identical sound files played at different volumes within SL.

Other issues faced in Study-1 included video recording reliability and quality. On one

occasion it was simply not possible to record the VW class due to an unknown configuration problem in LSRI facilities where the classes were held. The class was delivered anyway. For the sessions that were recorded, four screens were combined in one screen to show simultaneous interactions in real life and in SL for both the teacher and the students, and this affected the video quality and made the recordings harder to analyze. A clearer video recording of the interactions taking place was thus desired.

For the above reasons it was appropriate to run Study-2, building on the experience of Study-1, in order to overcome or avoid the problems faced and to produce data which would be more useful for the qualitative analysis, and that would help answer the research question in a better way.

7.1.3   Study-2 Objectives

The following objectives were projected for conducting Study-2:

- o To retain all or most student participants for better data collection
- o To compare the experience of participants through exposing them to two media of learning instead of one
- o To build on expertise gained during Study-1 to perform a more efficient Study
- o To collect better data that would help investigate the effectiveness of the VW medium in language learning as compared to face-to-face class teaching

7.2   Comparing Study-2 with Study-1

7.2.1   Similarities to Study-1

In trying to answer the same research question as Study-1, Study-2 resembled Study-1 in several ways. The similarity spanned research methods, class delivery plans, VW design, language used, among other similarities.

Study-2 used the comparative analysis method to compare between media. It also

used the same data collection methods as Study-1, including surveys, interviews, video transcripts of class interactions, and assessment of learning outcomes.

Study-2 also used the same class delivery plan and the same content and scenarios for language lessons. The classes were conducted at the same facilities, and the participants came from the same pool as Study-1, namely the University of Nottingham community.

The Arabic language was also used for the classes due to its suitability for the Study. Arabic was desired by the Nottingham community for cultural and career- related reasons, and was not known by the University community thus allowing for a fresh sample of participants. Moreover, the PhD researcher who delivered Study-1 and Study-2 classes is a native speaker of Lebanese Arabic.

Theoretically, Study-2 required fewer participants than Study-1, since it involved two groups of participants instead of three. However, larger groups were recruited for Study-2 which resulted in a similar number of overall starting participants.

7.2.2   Differences from Study-1

Study-2 was different from Study-1 in several ways. While Study-1 participants were volunteers, Study-2 participants were paid an inconvenience allowance to partake in class activities till the end. This was necessary to make sure participants did not drop out of the Study before it was completed, since out of the 24 participants that started Study-1, only ten completed the Study.   All 22 participants that started Study-2 completed the Study.

Study-1 used the parallel model of class delivery, while Study-2 used the cross-over model in which each group of students participated in both conditions.. It was thus more suitable to choose two media instead of three for the sake of the comparison Study. Study-2 compared the VW medium to the face-to-face only, skipping the video

conferencing medium from the analysis.

Face-to-face language learning is the dominant medium for learning worldwide, while VC is not used for language learning on a world-wide scale. Face-to-face learning was thus a more suitable reference for benchmarking learning activities in the comparative analysis. Another compelling reason for skipping the VC medium in Study-2 was that the facilities available faced technical difficulties in setting up VC at the time of the study.

The Pilot Study and Study-1 however both included VC classes for the sake of benchmarking the VC and VW media, so running VC classes in Study-2 would not have contributed much to the qualitative analysis and would have been redundant.

In any case, it was sufficient to perform a comparison between two media for the sake of the level of detail, experimental complexity, and data needed for the comparative analysis towards answering the PhD research question.

Study-2 was also different from Study-1 in the length and span of classes. Study-2 classes lasted for seven hours, compared with ten hours in study-1. While Study-1 classes spanned eight weeks, Study-2 classes took place in one week. Two reasons exist for these differences. The time available for the researcher to run Study-2 was much shorter than that available for Study-1 before having to return to his home country. Moreover, since participants were paid to complete Study-2, it was possible to condense the course delivery into few days with more confidence they would not drop the course.

Study-2 did not utilize the MLAT test to allocate the participants into groups. The idea was proposed, but time and budget limitations stopped its execution. The personal-data questionnaire was used for the purpose of student allocation across groups

instead.

7.3   Study-2 Description

7.3.1   Recruitment of Participants

Several steps were taken to recruit participants for the Study. Invitation pamphlets (Appendix 7.1) were distributed across the University of Nottingham campus, and contacts were made with the School of Politics and the School of Modern Languages to announce the Study.

An announcement was also posted on the LSRI website front page, and an invitation to join the Study was circulated on September 15th, 2009 to a mailing list of around two hundred participants who have joined LSRI experiments in the past. The email under the subject 'potential experiment' is included as Appendix 7.2.

Interest was evident as there was a quick response from 17 people who showed interest in participation. This was quite a good response, especially as it was during the University vacation period. Some asked about the inconvenience allowance, which was set at five pounds (GBP) an hour. Others needed more details which I sent promptly. Eventually, 22 participants were recruited for Study-2.

Before starting the Study, participants were required to read and sign an 'Information Sheet for Participants' (Appendix 7.3), and 'Participation Consent Form' (Appendix 7.4) that were written in accordance with the codes and guidelines of research ethics applicable in the UK at the time of the Study.

7.3.2   Research Ethics

As with Study-1, Study-2 research activities followed the ethical principles and guidelines for conducting research at the School of Education at the University of

Nottingham, which are in accordance with the British Psychological Society Code of Conduct, Ethical Principles & Guidelines (2001) pages 9-14, section on Ethical Principles for Conducting Research with Human Participants, and which are also in accordance with the Revised Ethical Guidelines for Educational Research (2004), pages 1-13, of the British Educational Research Association.

The research environment of Study-2 was identical to that of Study-1. Since approval had been granted by the School of Education to conduct Study-1 during the previous year, it was advised that there was no need to obtain another approval to conduct the new Study.

7.3.3   Background of Participants

Based on a Personal-Data Questionnaire (Appendix 7.5), the following information on participant background was collected. The 22 participants were 13 females and nine males. 17 participants were between the age of 20 and 29, three were within the 30-39 age-bracket, and two were over 40 years old. Eight participants were British nationals, five were Malay, and the remaining belonged to different nationalities. None came from an Arab country.

Twenty participants were students at the time of the survey and three were not. Fifteen students studied at the BSc level, four at the MSc level, and one at the PhD level. Their majors were widely spread across several disciplines. Out of the two participants who were not students, one had a BSc and one did not.

Eleven participants spoke two languages and eleven spoke three or more languages. Eighteen participants had no exposure to Arabic, and four knew a few words. On their motivation to learn a new language, fifteen participants enjoyed language learning, eight thought it would enhance their careers, and five needed it for travel. Five participants had no interest in learning Arabic, so they were obviously motivated by

the allowance for participation. Twelve participants were interested in Arabic to communicate with Arabs and to deal with Arab contemporary issues.

Ten participants had no prior exposure to online virtual words or animated computer games with an avatar. Five had used them a few times, five had used them many times, and two frequently used such environments including Sims, xbox 360, Second Life, and Age of Empires.

7.3.4 Group Allocation

By nature of the comparative analysis, groups of participants needed to be similar. Some of the factors considered for participant allocation into two similar groups include language aptitude, participant age, educational background, first language spoken, and background in Arabic.

However, due to the short time available for Study-2, the limiting factor while allocating Study-2 participants across groups was the participant time schedule. The two groups were referred to as Group-A and Group-B. Group-A took classes during the morning time and Group-B during the afternoon.

Due to the limitations in time and budget, the MLAT language aptitude test was not administered to divide Study-2 participants into groups. The majority of participants belonged to the same age group, and were college educated, so it could be assumed that they were exposed to language education at some point. However, for the sake of dividing participants across homogeneous groups, it was not clear at first that the participants had comparable language aptitude. After the final assessments were conducted, it was possible to compare group language aptitudes by comparing the final assessment scores of the two groups, which showed a similar performance and hence a similar language aptitude (see Table 7.1).

The similarity in language aptitude across groups was not however a major factor, since Study-2 was not based on a parallel comparison between groups using different media as in Study-1, but rather on the two participant groups using both media, where their experience would be a more solid indicator of the more effective medium.

None of the participants spoke a first language of the family of languages that Arabic belonged to. The four participants who knew a few words of Arabic were split across the two groups. Given the similar background of participants, and their near neutrality to Arabic, the group allocation was considered suitable for the study.

7.3.5   Class Delivery Model

The crossover class delivery model was used for Study-2. One group of participants took the class through the face-to-face medium before crossing over to the VW medium, while the other group started the class through the VW medium then switched to face-to-face.

The model was suitable and straight-forward for the comparison between two media rather than three, since using this model to compare between three media would have required a sequence of two crossovers.

The crossover model had an advantage over the parallel model in that it enables comparative participant feedback, as they experience both media in a single study. Feedback collected in Study-2 interviews captured how participants reacted to both media, and formed a part of the qualitative analysis.

Both groups used two media of learning. It follows that the need for similar groups in the cross-over model is less obvious and demanding than is the case in the parallel model.

Since participants learned through both media, the medium-of-learning outcomes were interdependent. What they learned through one medium could have contributed to their assessment results after learning through the second medium. To measure this effect, an assessment was conducted before the two participant groups switched media in order to assess the learning outcomes influenced by the medium that was used prior to the crossover, and another assessment was conducted for each group after taking the class through the second medium in order to compare the results of the two assessments and to deduce interdependencies.

7.3.6   Class Description

Email exchanges and short meetings were conducted during the week prior to the Study to explain its details to participants who had questions. The Study started on 29-9-2009. Day-1 meetings with participants were unstructured one-to-one meetings. The goal was to inform participants about the Study, to collect their background information along with their pre-study attitudes, and to initiate them in the VW Second Life.

On Day-2, Group-A sat for a face-to-face class in the morning (see Figure 7.1), while Group-B took the VW class in the afternoon. Both classes were followed by an assessment. On day-3, Group-A took the VW class in the morning and Group-B took the face-to-face class in the afternoon. Both groups sat for another assessment, filled the post-attitude survey and joined a group interview. A detailed Study-2 implementation table is included as Appendix 7.6. Table 7.1 details the activities that took place per group during each of the three days of Study-2.

Group/Activity	Day 1 - 29-9-2009	Day 2 - 30-9-2009	Day 3 - 1-10-2009
Group A	Consent Form SL user setup Personal Data Questionnaire Pre-Study Attitude Survey	Lesson 1 through Face-to-face Assessment for lesson 1	Lesson 2 through VW Assessment for lesson 2 Post-Study attitude survey Interviews
Group B	Consent Form SL user setup Personal Data Questionnaire Pre-Study Attitude Survey	Lesson 1through VW Assessment for lesson 1	Lesson 2 through Face-to-Face Assessment for lesson 2 Post-Study attitude survey Interviews

Table 7.1   Study-2 Class Activities using the Cross-Over Model

Figure 7.1   Group-A during a morning face-to-face session

Study-2 classes followed the same structure as Study-1 classes. Each of the two lessons delivered on a certain day covered three to four activities. After introducing an activity in a face-to-face class for 15 to 20 minutes, practice was conducted between instructor and students for about ten minutes. Students then practiced what they learned with each other in pairs, and on their own using the class handouts. The same process would repeat for the second activity delivered during that lesson. The difference between the two media used is that VW students used the practice boards as well as the handouts for reviewing class material.

All class activities were recorded (see Figure 7.2). For the face-to-face classes, the recordings were confined to the class location. For the VW classes, recordings took place simultaneously in the virtual world and in the real world.

VW class recordings included four video feeds that converged on a quad screen. The top two feeds were from the virtual world. One VW feed was that of the instructor's computer screen, and the other was that of a participant computer screen. The bottom two screens showed participants in the real world taking the class in the virtual world. Audio and video were simultaneously recorded to reflect a vivid picture of how the VW classes took place.

Figure 7.2   LSRI labs recording equipment. Visible on the top left is the quad video recording screen

Class delivery followed the same pattern on both days and using both media. The following is an account of Group-B taking the VW class covering Lesson 1 on the afternoon of Day-2. Before classes were conducted in Second Life (SL), a briefing session was conducted to inform participants on how the class would be conducted and what to expect during the class (see Figure 7.3). Lesson 1 class handouts (Appendix 7.7) were delivered to participants. After the briefing was over participants were divided across rooms where computers were setup with the VW SL clients, and

the PhD researcher along with LSRI support staff helped them getting started (see Figure 7.4).

Figure 7.3   Group-B during an afternoon briefing before a VW class

Figure 7.4   An LSRI staff member supporting a participant at the start of a VW class

After facing sound echo problems while running VW classes in Study-1, participants were spread wide apart across LSRI labs and offices. Two students were located in isolated sound booths which were installed as part of LSRI facilities (see Figure 7.5).

Some participants were situated at LSRI staff offices while the staff emptied their offices during VW classes (see Figure 7.6).

Figure 7.5   Participants sitting in sound isolation booths during the VW class

Figure 7.6   A Participant sitting in a staff member's office during a VW class

After all participants were situated in their locations to take the VW class, the PhD researcher took count of them making sure voice channels were all open (see Figure 7.7).

Figure 7.7   PhD researcher taking count of participants in a VW class

The researcher then delivered an introductory lecture of the class material using two large in-world identical screens with the class notes projected on, much like a presentation board in a face-to-face classroom (see Figure 7.8). Two boards were used so that lesson 1 and lesson 2 class material would be available for the instructor to project to the class as needed. In-class role-play activities were used to practice what was learned. The instructor would assume a role and would tell the student to assume another before a simple conversation would take place to go over lesson material.

The role-play stage was not used in Study-2 due to the lack of time available for the Study, which did not allow students to cover enough material to join lengthy discussions with each other in a naturalistic environment like at the hotel or at a restaurant. Role-play activities were thus limited to the VW main class location.

Figure 7.8   Two in-world presentation boards projected class notes to participants

While seven participants worked alone, four participants were grouped into pairs, with each pair using a single avatar for the VW lesson (see Figure 7.9). Every participant in a pair was however able to follow the lecture and join in class activities.

Figure 7.9   Pairs of participants working together on one computer interface using one avatar

After a 15-minute presentation of the first activity, the instructor divided participant avatars into small groups to practice what they have already learned (see Figure 7.10). Pairs of participant avatars were spread wide apart so no overlap of audio

conversations would take place. The participants were called back to the original VW meeting place to go through the next activity.

Figure 7.10   Avatars working in pairs to practice an activity

After three activities were concluded, participants were asked to use practice boards in order to practice what they learned on their own (see Figure 7.11). All activities covered in class were included in the boards, with each board covering an activity. As with Study-1 boards, Study-2 boards included the English word or phrase as an image, and the Arabic translation as a sound which was available to the participant every time a button was pressed on the board. Study-2 boards were made larger in size than Study-1 boards in order to allow for better visibility of the board content.

Figure 7.11   Individual avatars working on practice boards to review an activity

After about 15 minutes of practice, participants were called back into the main VW

meeting place, where they were asked to translate a few sentences from English into Arabic on their own papers. These sentences were made up of vocabulary and connectors that were covered in the earlier activities. After that participants were asked to share the translation with the rest of the class. Participants asked several questions as they were translating and then each shared the translation of one sentence.

Participants were then called back into the Physical location where the initial briefing meeting first took place. An assessment was then conducted to assess what they had learned in the VW class (see Figure 7.12).
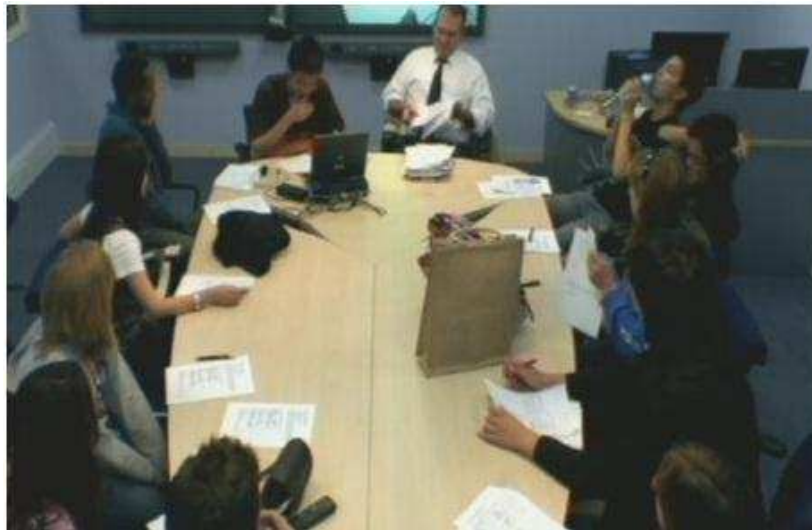
Figure 7.12 Participants in the VW class re-gathered in the classroom for the assessment

7.3.7 Research Data Collected

Assessments were conducted after each lecture to assess learning outcomes. Pre- and post-study attitude surveys were collected to get an account of student experiences of both media used. Interviews were made with participants in order to probe into their experiences while taking the classes. Class videos were reviewed using the critical incident technique described in section 3.4.6, in search of breakdowns and breakthroughs during the learning process that took place. Research data collected are

outlined in section 7.4 under the title 'Study-2 Results'.

7.4   Study-2 Results

7.4.1   Pre-Study Attitude Survey Results

Along with filling a personal data questionnaire, participants completed a survey before taking classes. Section 1 of the survey assessed participant attitudes towards language learning, while Section 2 assessed participant attitudes towards educational technology and media of learning. The survey is included as Appendix 7.8. The survey was completed by 21 participants. Results of the survey are shown below in table form.

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree	Comments
1. For me, learning another language is easy.		13	4	1	3	- Difficulty in pronunciation - Love learning languages
2. A second language is part of an educated person's profile.	9	9	3			
3. Learning another language is best done with native speakers while I am visiting their country.	6	11	3	2		
4. Learning another language would help me understand its culture better.	12	6	1	1		
5. If I travel to another country I find it important to learn its language because this would allow me to relate to its native speakers in a better way.	10	11				
6. Business today is global, but English is enough to do business globally.	1	3	7	9	1	Depends on cultural awareness of the country
7. I only like to learn a few basic words and phrases of another language without necessarily reaching an advanced stage.	2	1	3	13	2	- Without practice it is not possible to reach an advanced level - Need basic level to afford daily life
8. Overall I think it is important to learn another language.	10	11				
9. I prefer to learn a new language on my own, without the help of a teacher.		2	3	11	5	Depends on teacher and teaching methods used

Table 7.2   Study-2 Pre-Study Attitude Survey Results – Section 1

Section 1 revealed the following information. All 21 participants thought it was important to learn a new language. It formed a part of an educated person's profile, and it helped in understanding the culture where the language is spoken, and in relating to native speakers in a better way. Participants were divided on the sufficiency of English as a global language for business. Ten responded that it was not

sufficient.

Seventeen participants indicated that it is best to learn the language from native speakers while visiting a certain country. Thirteen responded that language learning is easy, and they desired reaching an advanced stage in the target language. Only two participants preferred learning on their own, while most of them preferred learning through a teacher.

Section 2 of the pre-attitude survey was to capture student attitudes towards educational technology and media of learning. Results of this section of the survey are included as Table 7.3.

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree	Comments
1. I have taken classes through educational technology before. If you did take such a class, through which media?	3	2	3	10	2	Internet - Online learning (Blackboard) - Virtual learning Platform
2. Technology allows reserved learners to express themselves more freely and hence better engage in the learning process.	2	9	8	2		
3. A face-to-face classroom is more effective than a remote classroom using technology.	6	8	7			More effective
4. Technology limits direct interactions with the teacher	4	6	5	2		I can't look at teacher's mouth for pronunciation
5. I prefer to take language classes through a face-to-face classroom. If so, why ?	6	9	5	1		Teachers are more accessible and available - More Teacher Student interaction
6. I like to explore a new medium of learning regardless of learning outcomes	6	12	2	1		
7. I am comfortable working with educational technology like e-learning.	5	10	4	1		
8. Technology allows more flexibility for learning anytime, anywhere If so, could you give an example or two?	8	9	2	1		Use iphone/MP3/MP4 Learn at own pace - Learn at home and during holidays
9. Some computer video games could be educational.	6	12	3			
10. What is the most effective technology tool that you experienced while learning? (Circle one that applies) a. Language tapes/CDs b. E-dictionary or Internet-based lessons c. Video conferencing d. Watching Movies or Educational TV	A 4	b 3	C 1	d 14		

Table 7.3   Study-2 Pre-Study Attitude Survey Results – Section 2

Section 2 results showed the following attitudes towards media of learning. Fifteen out of 21 participants were comfortable working with educational technology. Four of them had used tools such as language CDs, three had taken Internet-based lessons through a Virtual Learning Environment (VLE) called Blackboard, and 14 had learned through watching movies and educational TV.

Seventeen participants indicated that technology allows flexibility in learning anytime, on holidays for example, using portable tools such as iphones, MP3s and MP4s to learn at their own pace in comfortable surroundings such as their homes. Eleven responded that technology allows reserved learners the autonomy to express more freely and to better engage in the learning process.

Six participants strongly agreed and eight agreed that face-to-face learning is more effective than learning through technology. Ten responded that technology limits interaction with the teacher. One commented that technology limits teacher accessibility, and hinders the visibility of the teacher's mouth while words are being pronounced. Fifteen participants indicated that they preferred to take language classes face-to-face rather than through technology.

As a summary of student attitudes before Study-2 was conducted, students believed in the importance of learning a new language, and felt it is best done with native speakers. Most of them preferred learning with a teacher. Some students have been exposed to virtual learning environments like Blackboard and have taken Internet-based lessons, and several believed it provided flexibility in learning.

Not all students were comfortable however working with educational technology, and around two-thirds preferred face-to-face classes to technology-mediated classes. It can be concluded that the group of participants, which is mainly composed of college students, might not be very open to new media like VWs. Their limited experiences with educational media have generally not been very rewarding, and they favoured face-to-face language classes.

7.4.2   Post-Study Attitude Survey Results

A post-study survey was conducted for Study-2 as in Study-1 (Appendix 7.9). The

survey carried more information in Study-2 than in Study-1 since participants had been exposed to both media and had something to say about the comparison out of their experience of both media. The survey was conducted for each group of participants separately, and the results were filed for Group A as Appendix 7.10 and Group B as Appendix 7.11. The results however were very close, and are outlined together below as if they belonged to a large treatment group made up of both groups combined. Like the pre-study survey, there were two sections to the post-study survey. Section 1 assessed attitudes towards language learning, and section 2 assessed attitudes towards media of learning.

Nine participants thought that learning another language was generally easy, ten indicated that learning the Arabic language is challenging. Sixteen responded that they enjoyed learning Arabic. Eight indicated they were comfortable using the new language skills, and seven responded they were not comfortable, due to the short time available for lessons. Twelve wanted to further pursue learning Arabic.

Ten participants disagreed and eight strongly disagreed about learning alone without a teacher. One participant indicated that he would like to learn alone. Sixteen responded that language leaning is best done with native speakers, and 18 indicated that learning a language would help understand its culture better.

Twelve responded that the content, structure, and delivery rate of class material were suitable, and 18 indicated that classrooms were suitable. Two commented that the classes were unorganized, went too fast, were monotonous and dry with no photos.

Eleven participants indicated that the face-to-face classes were more effective than VW classes. Five participants commented that VW classes limited direct interaction with the teacher. While 17 responded that they like to explore new media of learning regardless of outcomes, 14 responded that they preferred a face-to-face language class

since class interactions were easier.

Twelve participants indicated they were comfortable with VW technology, and 18 indicated VW technology was flexible in learning delivery. Ten participants responded there were no similarity between an instructor in real life and that in a VW.

Fourteen participants indicated that they favoured a face-to-face classroom taking language classes. Six commented that their preference for face-to-face was due to interactions with teacher, as well as group and individual practice. One commented that more time was needed to get familiar with the VW interface. Another participant who was a frequent user of VWs was very supportive of VWs for learning.

Twelve participants indicated that pronunciation is best done in a face-to-face classroom. Six responded that VW is more suited, and six said face-to-face was more suited for learning vocabulary. Thirteen responded that practicing what was learned was easier in the face-to-face medium.

As a summary of the survey, it can be concluded that students generally enjoyed learning Arabic and wanted to pursue it further. They wanted to learn with a teacher who was a native speaker which they indicated helped in understanding the culture. This attitude was consistent with their pre-study attitude, and their VW language learning experience did not manage to change this attitude.

They generally favoured a face-to-face class over a VW class for language learning, and felt it allowed for better interactions with the teacher and other students, and served better to practice what was learned. This general result had an exception. A student who was a frequent user of VWs favoured them over face-to-face, and this goes to show the importance of being familiar with the learning environment. It was clear that starting with a group of VW users would have been more suited for the

comparison process.

7.4.3 Assessment Results

Each of the two groups of participants sat for two classes, and after each class there was an assessment (Appendix 7.11). The reason for holding two assessments was to judge the extent of influence each medium had on language learning. This was necessary since the cross-over model was used for class delivery. Both the PhD researcher and another professional teacher made the evaluation of assessments.

In measuring the learning outcomes of the activities that took place, the assessment immediately followed the class and had three sections. The vocabulary section assessed how well participants retained Arabic words. The sentence translation section determined if participants, when given the sentence in English were able to use words and connectors to construct a useful Arabic sentence. The pronunciation section was to assess how well participants pronounced problematic Arabic letters. The vocabulary and sentence translation sections were written, while the pronunciation section was verbal. Assessment Results are shown in Table 7.1.

The percentages listed in the middle column of the table are the means of scores collected by eleven participants in Group-A after sitting for two assessments, one conducted after Lesson 1 and the other after Lesson 2. The percentages in the right column are the corresponding results of Group-B.

	Group A	Group B
Lesson 1	77% (Face-to-Face)	62% (VW)
Lesson 2	48% (VW)	67% (Face-to-Face)
Group Averages	62%	64%

Table 7.1   Study-2 Assessment Results

The overall performance of Groups A and B in both assessments was comparable, with a 2% difference, which goes to confirm that the initial allocation of participants across groups produced groups of comparable backgrounds and similar performance. The learning medium performance results were, however, quite different. The mean percentage of participant scores for the face-to-face medium for both groups was 72%. The VW medium mean score for both groups was 55%.

For Lesson 1, Group-A using the face-to-face medium scored 15% higher than Group-B using the VW medium. For Lesson 2, Group-B using the face-to-face medium scored 19% higher than Group-A using the VW medium. These differences are quite large and difficult to justify in isolation from the performance of the medium being used.

The effects of the sequence by which media were used seem of little significance. Group-A took the face-to-face class first, but this did not contribute to a good result for the VW class that followed. On the contrary, Group-A scored much less in the VW class. One could argue, however, that since Group-A took the face-to-face class before the VW class, they had high expectations and were somewhat displeased when taking the VW class later, but this cannot be confirmed experimentally. Results of Group-B also did not show any inter-dependency between the assessment results of a class conducted through one medium over results of the following class using the other medium. What was clear, however, is that the results show a sizable advantage for the face-to-face medium over the VW medium, as the difference in results was

significant.

A statistical analysis was utilized to confirm the effect each medium had on assessment results. The Univariate Analysis of Variance (ANOVA) parametric test was utilized to test for dependency of assessment scores on the medium of learning used to deliver the lesson being assessed. The sizes of student groups A and B were similar, at eleven students each, with no student missing any lesson delivered. Groups are required by the ANOVA statistical tests to be independent. Group independence was assumed as there were no common criteria between participants except their association with the University of Nottingham as students.

Another requirement for the ANOVA test is that the numerical data representing samples are drawn from normally distributed populations. Two tests for normality were applied on the scores of the four assessments conducted. The null hypothesis was that the data is normally distributed as required by the parametric test. It was found that the results of sections one and two of the exams were normally distributed (refer to shaded numbers in respective tables). Section three results which involved pronunciation violated these test. Please refer to tables 7.2 and 7.3 for the data normality test results.

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
section1	.121	44	.110	.955	44	.085
section2	.086	44	.200[*]	.970	44	.291
section3	.186	44	.001	.896	44	.001
Overall	.096	44	.200[*]	.977	44	.519

Table 7.2   Test Results for data normality required by the ANOVA

		Students	Group	Lesson	LM	section1	section2	section3	overall
N		44	44	44	44	44	44	44	44
Normal Parameters[a,b]	Mean	6.00	1.50	1.50	1.50	18.77	15.45	27.98	62.00
	Std. Deviation	3.199	.506	.506	.506	7.764	8.091	2.183	14.536
Most Extreme Differences	Absolute	.099	.339	.339	.339	.121	.086	.186	.096
	Positive	.099	.339	.339	.339	.121	.073	.109	.095
	Negative	-.099	-.339	-.339	-.339	-.088	-.086	-.186	-.096
Kolmogorov-Smirnov Z		.654	2.246	2.246	2.246	.801	.572	1.234	.635
Asymp. Sig. (2-tailed)		.786	.000	.000	.000	.542	.899	.095	.815

Table 7.3   One-Sample Kolmogorov-Smirnov Test Results for data normality

Another requirement of the ANOVA test was that the variance of the data analyzed is homogeneous. The test for homogeneity of Variance showed that the data from the first two sections of the assessment had homogeneous Variance, while the third section violated this test (see Table 7.4, shaded rows).

		Levene Statistic	df1	df2	Sig.
section1	Based on Mean	.087	1	42	.770
	Based on Median	.055	1	42	.816
	Based on Median and with adjusted df	.055	1	40.109	.816
	Based on trimmed mean	.069	1	42	.794
section2	Based on Mean	.343	1	42	.561
	Based on Median	.269	1	42	.607
	Based on Median and with adjusted df	.269	1	40.338	.607
	Based on trimmed mean	.315	1	42	.577
section3	Based on Mean	8.215	1	42	.006
	Based on Median	7.125	1	42	.011
	Based on Median and with adjusted df	7.125	1	37.273	.011
	Based on trimmed mean	7.636	1	42	.008
Overall	Based on Mean	.135	1	42	.715
	Based on Median	.069	1	42	.794
	Based on Median and with adjusted df	.069	1	41.723	.794
	Based on trimmed mean	.117	1	42	.734

Table 7.4   Test Results for Homogeneity of Variance required by the ANOVA

The ANOVA test was conducted to determine the significance of the learning medium (LM) over the assessment results. The assessment results were divided per section.

The section grades were originally divided between sections as follows: Sections 1 and 2 were over 35%, and section 3 was over 30%, but since the ANOVA test required all weights to be equal, the results were weighted so that each section was over 33.3%. Table 7.5 contains assessment results for Group-1 for Lesson 1 as an example.

Lesson 1 Assessment Face-to-Face	Section 1 of Assessment /33.3%	Section 2 of Assessment /33.3%	Section 3 of Assessment /33.3%	Total score /100%
Student A1	28.57	28.57	27.77	84.92
Student A2	28.57	21.90	26.66	77.14
Student A3	22.85	23.80	25.55	72.22
Student A4	14.28	7.61	25.55	47.46
Student A5	9.52	3.80	25.55	38.88
Student A6	31.42	13.33	26.66	71.42
Student A7	22.85	20	23.33	66.19
Student A8	31.42	28.57	26.66	86.66
Student A9	14.28	18.09	30	62.38
Student A10	19.04	18.09	23.33	60.47
Student A11	27.61	22.85	22.22	72.69

Table 7.5   Lesson 1 Assessment Results for Group-A

The criteria Alpha (Error in the Significance Hypothesis) for the ANOVA test was 0.05, or 5%. Any result below that value was considered significant. The results of the ANOVA test found significant relation between the learning medium (LM) used and the assessment results for sections 1 and 2. Section 3 scores were not significantly affected by the Learning medium (LM). Sections 1, 2, and 3 ANOVA results are listed as Tables 7.6, 7.7, and 7.8 respectively.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	432.818[a]	1	432.818	8.420	.006
Intercept	15506.273	1	15506.273	301.663	.000
LM	432.818	1	432.818	8.420	.006
Error	2158.909	42	51.403		
Total	18098.000	44			
Corrected Total	2591.727	43			

Table 7.6   ANOVA Results for Section 1 scores as the dependent variable

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	305.818[a]	1	305.818	5.119	.029
Intercept	10509.091	1	10509.091	175.913	.000
LM	305.818	1	305.818	5.119	.029
Error	2509.091	42	59.740		
Total	13324.000	44			
Corrected Total	2814.909	43			

Table 7.7   ANOVA Results for Section 2 scores as the dependent variable

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.205[a]	1	.205	.042	.839
Intercept	34440.023	1	34440.023	7063.836	.000
LM	.205	1	.205	.042	.839
Error	204.773	42	4.876		
Total	34645.000	44			
Corrected Total	204.977	43			

Table 7.8   ANOVA Test Results for Section 3 Scores as the dependent variable

Section 3 of the assessment was verbal. The instructor asked students to repeat ten words behind him. For each word, a grade of 1, 2 or 3 was given, depending on how close the pronunciation was for the actual Arabic language sound. Most students were able to perform well on this section, even those who did not do well on the first two sections. Their performance was tied to how well they could spell out a word they just heard. This explains why the learning medium used had no effect on section 3 scores.

However, the significant impact the learning medium had on the scores of sections 1 and 2 goes to prove that the face-to-face medium allowed students to score better results than the VW medium did.

7.4.4 Interview Results

As with Study-1, interviews were held with groups of participants after the last class session. The set of ten questions (Appendix 7.12) were open-ended, covering similarities and differences between media, how well each medium performed, what were the difficulties in learning that each medium posed, and what could be done to improve it. The interviews started with the general questions outlined in Appendix 7.12, but did not strictly follow the sequence of questions, allowing students to express their thoughts more freely.

The discussion covered all ten questions, not in the same order listed, but as the discussions with students were leading. There was a continuity of discussion allowing participant ideas to flow and surface. The instructor tool notes of what was said much like taking the minutes of a meeting. Interviews were video recorded and were reviewed to confirm results. Interview results are outlined next.

On the similarities, like the face-to-face class, the VW class allowed class communications, discussions and interactions between students and teacher. Students had the feeling of sitting in the VW class, much like the feeling of sitting in a face-to-face class. The content and structure of both classes were also similar.

On differences, VW offered freedom through hiding the students' identity behind their avatars, allowing them to be less reserved. The VW class also offered learning at the students' own pace with the possibility of repetitions for practice, but posed problems to learning through the surrounding noise. It was also difficult to navigate and utilize the VW.

When asked which medium gave a better understanding of lectures, 19 answered that the face-to-face class did, and three said that the VW class did. All agreed that the face-to-face medium allowed better communication with the instructor and with other

participants.

Sixteen participants said that the face-to-face class allowed them better command of vocabulary. Six said that the VW class gave them better command of vocabulary, which could be attributed to the practice boards of vocabulary used in VW classes. All participants agreed that the VW allowed them to work at their own pace.

According to participants' comments during the interviews which were noted by the instructor, problems posed by the VW medium spanned sound problems like echo, delay in controlling avatars and in communication, physical isolation from the group, sitting down behind the laptop for a long time, and getting tired.

When asked about the successes of the VW medium, participants commented that the ability to run the class in the VW was by itself a success. They also commended the possibility of joining the class remotely. Some enjoyed the role-play, and appreciated getting help when needed, others appreciated working at their own pace with time to reflect and concentrate better since they worked in a better way when alone.

A participant commented that in the VW class, there would be no prejudice against older people as they are not visible behind their avatars. There would also be no bullying of some group members over the others. 'Clever people' would however be denied the opportunity to show their skills.

When asked on their recommendations to improve the VW medium, some participants commented that they needed more practice time and guidance to build VW competence, and to move the avatars more easily. Others commented that sound needed to be improved.

Some suggested infusing more real-life Arabic culture into the VW environment,

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while others suggested more interactive objects. A participant suggested some kind of in-world rewards for doing the 'right stuff', much like cookies in a face-to-face class, or bonus points in a video game. Another participant noted that the VW was more suited for revisions than it was for synchronous real-time learning.

7.4.5 Critical Incident Analysis Results

As with Study-1, Study-2 VW class videos were rich with critical incidents. Recorded videos of lessons were reviewed, and each critical incident observed by the PhD researcher was logged on a Transcript of Incident paper (See Appendix 6.11) which specified the Study name (1 or 2), the medium used, the incident number and title, the lesson and date, and the time into lesson when the incident was observed. When all papers were collected, they were reviewed and categorized according to the nature of the incident, weather a breakdown or a breakthrough. Then each category was reviewed for certain patterns or themes of occurrences, and after thematic analysis, main themes were determined for each category.

For breakdowns, the themes were technical failures, with a specification of the type of failure encountered, a VW usage error, an activity-related breakdown or language misunderstanding, a learning activity failure where participants do not understand the required learning task, student fatigue, as well as other incidents which were not very common. As for the Breakthroughs category, this included the themes of understanding of lesson material, successful completion of task, enjoying learning, as well as other breakthroughs which were less common.

Typical breakdowns and breakthroughs are outlined next. Although it was possible to complete the VW sessions, breakdowns in SL 3D voice were evident throughout the session. 3D voice had ten controls within the SL client software. They adjust a variety of system and SL sounds. With all controls adjusted to suit the lesson, there were several non-uniformities in sound ranging from leakage of sounds across large distances in SL, to non-uniform sound and often soft audio output in practice boards.

Echo was also a recurring incident. Participants were spread far apart across different locations with no sound physically crossing in between these locations. Two students were based in two sound booths used in professional recording studios which completely isolated sound. A possible source of echo seemed to be sound leakage between the speakers and the microphone on the same headphone unit. While it might have been possible to resolve the issue using professional headphones, it is difficult to imagine such a requirement on the average user of VWs.

The whole VW scenario was demanding in terms of human concentration. The researcher had to exert great effort in delivering the class, and participants also were under stress while taking the class. One participant had a headache at the end of the lesson because of such stress, as she commented and captured on video.

A unique incident was faced with a participant who did not know how to move the laptop mouse to be able to navigate in SL, did not ask for help until later, and was not able to join the first part of the lecture. This breakdown was classified under the learning activity category, but it should have been avoided if more VW training time was available before classes.

Several breakthroughs included humorous interactions, excitement about SL environment and practice boards used, and the success in carrying all the activities that took place in a face-to-face classroom. These were evident through recurring patterns of positive reactions the students made and captured on video.

As a conclusion to the critical incident analysis, it was very clear both to the teacher and the participants that the SL environment did not offer near the quality of a face-to-face classroom. Several technical problems plagued the classes, and also unfamiliarity with the environment made the problems worse. Breakthroughs were however

possible in that the lessons were conducted on schedule with learning taking place, and with student enjoyment of the new learning environment.

7.5   Chapter Summary

This chapter discussed the design and implementation of Study-2 that was geared to assess how well a VW class served language learning when compared to a more conventional face-to-face class. The need for Study-2 was presented, followed by an outline of the differences between Study-2 and Study-1. In Study-2, participants had to complete the classes before being paid an inconvenience allowance. Study-2 utilized the cross-over class delivery model that was used to deliver two lessons to two comparable groups of language learners, in which groups switch media after one lesson.

Study-2 was described, including the classes delivered, the learning spaces, and the research tools used to collect data. Results of the critical incident technique applied to recorded class videos was presented, including problems faced, such as the technical problems with non-uniform 3D sound or annoying sound echo, which hindered the delivery of language classes through the VW medium.

Interviews held after lessons were over, and post-study surveys completed by participants showed that the face-to-face medium was favoured by participants over the VW medium. Class interactivity was more attainable through the face-to-face class, and students were more comfortable taking the face-to-face class than the VW class. A participant who was familiar with the VW medium, however, has been keen to recommend it over the face-to-face medium. Further work is needed to generalize this result, through working with participants who are frequent users of VWs.

Results of class assessments conducted after each lesson came consistent with overall student attitudes. The face-to-face medium has allowed participants to achieve better

scores than the VW medium. This result was consistent regardless of the order by which mediums were utilized within the cross-over class delivery model. A statistical analysis of the assessment results confirmed that there was a significant effect of the medium used on the scores achieved.

The VW medium has strides of developments ahead before a fair comparison with a face-to-face medium could be held. Besides technical limitations of VWs, The clear advantage of the face-to-face medium over the VW medium is that people are used to it, and if research is conducted with participants who are used to the VW, the results might be different.

Chapter 8

Discussion of Results

8.1 Introduction

A Pilot and two studies were conducted to assess the relative effectiveness of VWs in the delivery of language learning as compared to traditional media, in particular a face-to-face classroom. Chapter 8 is dedicated to the discussion of results from these studies in the light of how well the design requirements of VW learning spaces were met, and in relation to the research tools that were utilized throughout the studies.

The discussion starts with a reflection on these studies in the light of design requirements that were drawn from existing literature and that were used to design the VW learning space. Each design requirement is reviewed in terms of how it was applied, how well it was met, and what could be done to better meet this requirement in later studies.

After discussing successes and the failures in meeting design requirements, research data collected from attitude surveys, interviews, and video recordings of Study-1 and Study-2 class activities is synthesized, and results are critically analyzed in terms of the effective delivery of language learning through VWs.

Findings of the research project are then outlined, creating a coherent summary of the compound experience collected from running the Studies. This leads to an answer to the question whether VWs could offer appropriate environments for distributed learning in general, and language learning in particular. The chapter concludes with a discussion on the strengths and weaknesses of the methodology used in the research project.

8.2   Review of VW Design Requirements

8.2.1   Overview

In chapter five, section 5.1.2 outlined a set of design requirements for the VW learning space that were drawn from literature outlined in section 2.4.5 on the potential for VWs in education and the learning opportunities they provided. After conducting the Studies, these design requirements were revisited, one by one, to see whether they have been met in course of the research project.

8.2.2   Real-Time Audio Communications

The first design requirement for the VW learning space was the provision for real-time audio communication among users and between the instructor and users. The quality of the audio needed to be good enough to allow natural communication and to hear pronunciation, and to facilitate group practice of learned material.

This requirement has been partially met. Audio communication was possible between the instructor and the students and between the students as they practiced in pairs. Individual students were also able to use practice boards that produced an audio output. While basic audio functionality allowed classes to proceed in both Study-1 and Study-2, the quality of 3D audio used in SL was found lacking on several fronts.

The audio quality was inconsistent. For example, audio worked well during some lessons, and did not work well during other lessons. While this fact could be technically justified, students suffered from it and the results of post-study surveys reflected this issue.

Adjusting the audio settings of the SL client application installed on user PCs was not straightforward, and took from five to ten minutes out of a given 80-minute lesson.

Even with optimal audio settings on the SL clients, one or two clients would still be facing audio problems 20 minutes into the class.

Warburton (2009) quotes one exasperated tutor who wrote the following comment on the popular *Second Life* Educators (SLED) list when trying to use audio in-world:

> *... teaching with voice can be such a pain. There's always someone who has a problem. Used to be that the problem was related to SL, but more and more, it's just that they [students] don't know how to adjust their settings. I finally sat down and made up a class handout with screenshots that I hope will make my teaching easier in the future.*

A major problem in SL audio was echo, which gave some students a headache, as evident in video recordings of classes. It was not clear during Study-1 whether the echo was generated locally through the complex recording scenario that was used. While running Study-2, students were spread further apart to rooms across the LSRI building, and two were located in sound booths which provided a high level of audio isolation.

The problem of echo was reduced in Study-2, but was still persistent, which led to the assumption that sound was looping from the student's headphones to the microphones on the same headset. Echo could have also been caused by the VW 3D audio engine.

Non-uniform performance of 3D audio was another problem faced during the studies. Audio was supposed to fade away with distance, simulating how audio fades in real life due to signal attenuation and surrounding noise. During some language lessons however, when students were spread far apart for practicing in pairs, there was an overlap between audio channels originating from audio sources far apart, so the conversation between one pair would be heard loud and clear by another pair situated

at a distance of 100 meters or more.

A problem was also faced when avatars were very close to each other. The sound level was not limited to a certain maximum volume and so when the instructor's avatar came close to a student to speak to them, the sound was very loud in the student's headphones.

Besides problems related to the performance of the 3D audio engine and possibly with its interface with the SL physics engine that determines parameters like distance between avatars, several audio problems could be attributed to the audio system architecture and the nature of the Internet through which the system operates. SL servers are centrally located in data centres, and all audio communications was thus centralized with these servers. For any given two-way audio channel, the voice of one party needed to travel to a SL data centre for processing, before transmission to the other party. This caused time delays higher than normal Internet-based audio systems (voice over packet) which transmit audio directly from sender to receiver.

While these delays could be tolerable for users with adequate bandwidth links, that are located in geographic areas like Europe which is close to where the SL servers are located in the US, delays caused by this model are not optimal for audio communications across the Internet. When pilot tests on SL audio were conducted during 2007 from Lebanon, audio quality was not suitable since delays were large, even while using the University of Balamand Internet link which is considered to be a relatively large for the country of Lebanon.

The Internet is a complex combination of communication networks and servers, with a variable load that considerably differs when a certain heavy-usage country like the US is asleep from when it wakes up. Moreover, when a problem affects one part of the link, the whole system is affected. For example, any problem faced with local networks, remote networks, or intermediate networks would negatively reflect on the

audio quality.

Any problem faced with SL servers, either during periods of extra loads or during server maintenance, would also add to the audio quality problems. A problem that could affect voice quality, for example, is how SL islands are distributed across servers and whether adequate resources are provided per server, which would allow for a consistent audio performance on a certain island when heavy activities are taking place on SL islands which are collocated on the same server.

A set of recommendations on how to avoid audio problems includes changing the audio system architecture, creating a special network with a certain quality of service, or installing the VW server locally. An explanation of these concepts is included in the recommendations section of this chapter (section 8.3.1).

8.2.3   Ease of Use

The second design requirement for the VW learning space was its ease of use: conditions that allowed users to quickly learn the basics of online VW navigation, so as to be able to focus on language learning rather than technical details of VW interactions. A first step towards using the SL interface easily is to be able to use a desktop or a laptop easily. Using the mouse or the keyboard with ease are necessary skills before easily navigating the VW interface.

Using the SL interface requires a steep learning curve (Inman, 2010). The interface is not similar to any common and well known navigation system such as the windows platform. This means that it would be new for the majority of users, and while it is safe to describe the SL interface as simple to use, it takes time to get familiar with the avatar identity representation, and the many options available for appearance, actions, and gestures. Time is also needed to get acquainted with the avatar's response to the several controls available for its navigation, as well as the many perspectives

available for viewing the surroundings.

The response time for moving the avatar around ranges from 300ms to 3 seconds, depending on several types of delay between SL clients and servers. Round-trip delay in related to the distance travelled between client and server. This could be as large as 500ms for inter-continental traffic, and as large as 1sec for Internet links that utilize satellite communications. Network loading and congestion delays further add to round-trip delays.

Algorithmic delays are related to the processing of client commands to move the avatar around by SL servers. Algorithmic delays mount as the complexity of the VW environment increases. The more objects present in the learning space, the more time is required for rendering these objects in real-time to create an immersion experience, and the more algorithmic delays are suffered. Server loading adds to this type of delay. Algorithmic delays are also a factor on the client side, and this is why SL requires a certain minimum set of specifications for running the SL client. The more graphics and memory capacity available for client computers the better response and lower algorithmic delays suffered on the client side.

When users have become familiar with controlling their avatars, they need to become familiar with the VW environment. For example, they need to know how to find locations inside an island when they wander off the learning site, or how to find SL islands through a less-than-perfect search engine that is not very tolerant of entry mistakes like Google is. To find the University of Nottingham Island for example, one had to type in those exact words. Typing 'Nottingham' would not yield any results.

Students in Study-1 had been first given an orientation session in SL to get them enrolled and started before taking classes. They were then directed to an island called 'Orientation Island' where they went through a series of practices to learn how to

control their avatars, how to have different perspectives of surroundings, and how to control objects around them. Study-1 classes were delivered over a period of two months, and students had several opportunities and a relatively long time to get familiar with the interface and with the VW environment. Study-2 was however run over a much shorter period than Study-1. Two participants had prior experience in using VWs, and were at ease in navigating the VW, but the remaining participants faced a steep learning curve while getting familiar with the SL environment. A short orientation session in SL and spending some time navigating the VW for a day or two was not sufficient to create a sense of ease and familiarity with the interface and the VW in general.

In conclusion, the ease of use design requirement has been met, but it is very important to give students sufficient time in getting familiar with the VW in order to enjoy their immersion experience and to better benefit from the learning opportunities it provides. Further recommendations on the VW ease-of-use is presented in section 8.3.2.

8.2.4   Interactivity with Objects

The third design requirement for the VW learning space was allowing for interaction between users and objects that facilitated learning. This kind of interaction was envisioned to allow for individualized learning, to match learning delivery to the rate of learner ability to absorb material, and to give the learner a better sense of being immersed.

This design requirement has been met while conducting Study-1 and Study-2. Interacting with practice boards allowed students to review their language lessons at their own pace, and has been useful for students while learning the Arabic language as evident from their feedback. The practice boards were organized per activity, where each activity, like learning numbers, or learning how to greet someone, was

programmed on one practice board that included between ten and 20 words or phrases. Students were able to access these boards at any time and, depending on the activity they wanted to review, they would go to the corresponding practice board with the title on top of it showing its content. Students would then go through the vocabulary associated, pressing a sound button to play audio files of the desired words that appear on the screen.

Words that appeared on the screen when the audio button was pressed were pronounced in English first and then in Arabic, in order to help students make better association of vocabulary. Being able to repeatedly play the sound file associated with a certain word allowed students to memorize the Arabic vocabulary and also to grasp the right pronunciation of these words.

However, problems were faced with stored audio files that played the Arabic words during practice. Non-uniformity in the sound level was suffered with practice boards, which sometimes worked well and some other times produced a very low audio output. Even with the same audio file loaded to two given sound boards with the same program, the audio output level of certain boards was sometimes found to be significantly different.

Another significant issue relating to interactivity with objects is the difficulty of establishing and maintaining content stored on these objects. While programming, or scripting of objects is not very demanding, and while many codes or scripts are readily available off the Internet or could be purchased in-world, special formatting of images and sound files is required for suitability with the environment. Moreover, the procedure for uploading content to objects is lengthy and cumbersome since it is easy to make a mistake. There is also a cost associated with uploading images and sound files on SL servers.

In conclusion, the design requirement for interactivity with objects has been met. Problems with 3D voice however hindered utilizing this capability to its full potential. The difficulty of building objects is another hindrance facing its effective utilization. Recommendations for easier management of objects and their learning content are presented in section 8.3.3.

8.2.5   Flexibility in Learning Spaces

Another design requirement was that the VW learning space had to be flexible in terms of the configuration of meeting places, allowing the teacher to easily configure learning spaces suitable for the learning activity at hand.

This flexibility has been achieved in the course of the studies conducted. There have been several learning scenarios used during the delivery of classes. The first learning scenario was a 20-minute introductory lecture during which the students were sitting in chairs in front of a large presentation board where the instructor introduced the activity at hand and briefly practiced with students through applying what was taught.

The second learning scenario was practicing in pairs. When the instructor felt participants were ready for such a scenario, the learning space was pre-programmed as such, and the instructor would choose the class seating arrangement desired by pressing the corresponding control button, forcing chairs to move to the corresponding far-apart suitable pre-set locations with avatars still sitting in their chairs, enabling students to carry out practice conversations without audio interference with other pairs or students.

Other pre-programmed seating arrangements were available for the instructor to conduct the learning scenario of choice, like a small group meeting arrangement with few chairs, or a large group meeting with chairs arranged in a large circle.

8.2.6   Identity Management

A further design requirement was that the VW learning space had to be manageable by its users when it came to choice of identity and in-world apparel. This requirement has been met by the SL VW environment. While signing up for the SL account, students were able to choose their avatar names and basic looks (boy or girl, etc). Later they were also able to configure the looks of their avatars, like face features, hair colour and style, body shape and size, clothes, etc (See figures 8.1 and 8.2).

While some students used these features during Study-1 to customize the looks of their avatars, the main restriction during Study-2 was the short time which prevented students from utilizing this feature.

Figure 8.1   A Study-1 participant configuring her avatar's hair colour and style to match her own hair style and colour.

Figure 8.2   A student dressing her avatar with a jacket and a belt.

8.2.7 Flexible Role-Play Learning Space

The VW learning space had to provide for natural settings that would give a sense of presence and would facilitate the role-play activities that take place during the learning sessions.

The design requirement for flexibility in role-play learning was met in the role-play learning area. The area was organized around a large stage, with four large photos associated with four scenarios for conducting role-play activities. Each learning scenario would include chairs, tables, or kiosks that were pre-designed for language practice through assuming certain roles.

At-the-airport scenario included a large photo of an airport in the background, and a Kiosk behind which the passport control officer would sit. Students would assume the role of a passenger or an officer and would practice the lesson material. Other scenarios included a hotel lobby, a restaurant, and at the University.

Shifting between the learning scenarios was a matter of selecting one of four corresponding controls. Chairs, tables, and kiosks were pre- programmed to appear or disappear off the stage depending on the learning scenario selected. This allowed for great flexibility and gave the instructor the ability to perform several role-play activities during the same lesson with no effort.

8.3 Recommendations on Design

8.3.1 Recommendations on Audio Quality

The many audio issues faced deserved further investigation, each through a specialized study that would be outside the scope of this research project. It is however possible to present general recommendations to deal with or to avoid audio problems in SL.

One recommendation to deal audio problems would be to change the audio system architecture, allowing a direct audio channel between the users. This would minimize the delay during an audio conversation, and bypass several Internet nodes, thus minimizing network congestion effects. This would however require distributing the 3D audio functionality to clients for immediate feedback and better response from 3D audio engine which would, in turn, require more processing from the client computers.

Another recommendation is to create a private network over the Internet that would guarantee quality of service to the audio channel as well as other features of the VW navigation experience. Such networks have been done before. Mbone (Multicasting Backbone) for example is a special international network that is separated from the Internet backbone, and dedicated for Multicast traffic, such video streaming traffic between one server and several clients. A similar private network has also been suggested for gaming traffic.

Such a network would not necessarily require a separate physical infrastructure. Logical separation and differentiation of traffic could be achieved through several networking technologies available. Quality-of-Service mechanisms that ensure the timely delivery of time-sensitive traffic like voice-over-packet are achievable through Internet routers and switches, and through end-to-end Intranets that provide for logical separation of traffic and better audio performance.

A third recommendation to avoid several audio problems is using a local server for running the VW. Opensim is an open source version of SL which runs as a stand-alone server application that can be run locally to provide VW simulations on a small scale. This would isolate several of the audio problems that are caused by network delays and congestion or server loading and bad resourcing. Running a VW locally

would however deprive its users from the vast resources and user base of an online VW.

As a conclusion, changing the SL audio system architecture or creating a private network overlaying the Internet that preserves quality of service for audio might be restrictive. A readily available solution to audio problems caused by networks connecting VW clients to VW servers is to install Opensim on a local server, to make sure that audio problems caused by networks are under control. Problems with 3D audio would however haunt this setup if not resolved by the developer of the 3D audio engine.

8.3.2   Recommendations on VW Ease of Use

VW ease-of-use is tied to several factors. Familiarity with the computer used to access the VW is often taken for granted. If a user is not at ease with using a computer mouse or keyboard, they would certainly face trouble while navigating the VW. One participant in Study-2 was accustomed to a desktop interface but did not know how to use a laptop mouse pad, and so he suffered for some time before being able to navigate his avatar.

The type of input/output interfaces used to access the VW through a desktop computer could influence the ease-of-use of the VW interface. A joy-stick for example could be used to move the avatar around easily. Haptic devices could be designed to allow the control of the avatar in a more natural way.

An eye-tracking system for example could be interfaced with the VW client to control the view position, angle and zoom level so as to minimize the effort needed to view the surrounding VW environment. Numerous other ideas are possible, but conditions for wide-scale adoption are practicality, effectiveness, and low cost.

8.3.3 Recommendations on Content Management

This content management process is restrictive for the average teacher, both in terms of designing and programming the interfaces, and in maintaining relevant content. It would thus require collaboration between programmers, instructional designers, and educators to allow for the placement of useful learning objects in SL. Moreover, software that would streamline the addition or modification of content is necessary to allow teachers to maintain content in-world.

Tools like content management systems (CMS) allow anybody with word- processing skills to maintain complex websites through modifying content blocks in website templates. A similar system would help in simplifying the content publishing process in VWs, making it simple enough for widespread use in education.

8.4   Language Learning Results

8.4.1   Student Feedback

In Study-1, only two students out of seven completed the VW classes. Both students expressed interest in pursuing learning Arabic. One student was not comfortable with learning through VWs, while the other student believed that it was somewhat similar to a face-to-face classroom. Both participants agreed that Virtual Worlds technology allows more flexibility for learning anytime, anywhere.

In Study-2, participants were able to compare between the VW and face-to-face classes since they took lessons through both media. All 22 participants who completed the classes were interviewed, and 19 of them filled in post-study surveys. The attitudes were generally not in favour of VWs for language learning.

Eighteen participants preferred learning with a teacher, and only one indicated that he

would like to learn alone. Eleven participants indicated that the face-to-face classes were more effective than VW classes. Five participants commented that VW classes limited direct interaction with the teacher. Fourteen responded that they preferred a face-to-face language class since class interactions were easier.

One participant commented that more time was needed to get familiar with the VW interface. Another participant who was a frequent user of VWs was very supportive of VWs for learning and indicated that learning through the VW was an overall positive experience. It can be deduced that the level of familiarity with the VW has an impact on student attitudes on learning through it. Ten participants responded there were no similarity between an instructor in real life and that in a VW. This could be an area of improvement in which modelling the instructor in a better way that would more suited for learning delivery.

Twelve participants indicated they were comfortable with VW technology, and 18 indicated VW technology was flexible in learning delivery. While over half the participants were comfortable learning through VWs, almost all of them realized the opportunity VWs provided for flexible learning. Twelve participants indicated that pronunciation is best done in a face-to-face classroom. Six responded that the VW was more suited for learning vocabulary. Thirteen responded that practicing what was learned was easier in the face-to-face medium. The practice boards seemed to provide an advantage to some students, but to some others this was not the case. The issues faced in audio non-uniformity while using practice boards justify this position.

Students were generally not ready to give up face-to-face learning. Yet, they realized the benefits VWs offered in flexible learning. A mixed-context approach to language learning would cater for such a group, in which VWs constitutes an integral part. The richness of the VW medium would be exploited for activities conducted outside the classroom, and for group activities that involve role-play and require naturalistic

environments. A flexible and bidirectional link between the face-to-face environment and the VW enables synchronous and seamless interaction between users and devices across both worlds. In such a scenario, VWs assume the role of spatial extensions of face-to-face and online learning scenarios, through an interconnection that allows for a closer relationship between virtual learners and the real world (Lucke, 2011).

8.4.2 Assessment Results

Study-1 assessment results were similar across the three media used for class delivery. This is however to be viewed in light of two facts. The dropout rate was severe in the VW group. This indicated that five out of seven students lost all motivation to continue the VW classes. The other fact was that the time to deliver the courses was long, about two months. This relatively long time of exposure to language would give the students more opportunity to comprehend content and prepare for the assessments.

After one training session, Study-2 classes were delivered in two days. This short time of exposure to language would improve the reliability of assessment results, as it would illuminate the time factor in comparing results. The short time however diminished the opportunity for students to get familiar with the new medium and to better appreciate its capabilities, and this could have partly caused their poor reflections on their experience of it.

The difference in assessment results was large, and it was in favour of the face-to-face medium. A statistical analysis of the results has shown a significant effect of the media used on the assessment results. It can be concluded that although the VW medium was useful and effective in delivering the language class, it was not as effective as the face-to-face medium in language learning delivery.

8.4.3 Video Transcripts

VW class videos were reviewed for both breakdowns and breakthroughs in learning.

While VW class videos were watched, incidents were filed, one per page, and were then categorized according to their nature, whether breakdowns or breakthroughs, leading to trends that were common within each category. A summary of the critical incident analysis of the VW class videos have shown the following trends.

Most students were new to SL and to VWs in general. Some of them faced issues with navigating their avatars at first, but were all able to complete the classes. The newness of the medium has triggered interest in students, and they were amused at some of the capabilities of the new medium. The practice boards were very useful, and the role-play area was particularity enjoyed. Participants also discovered the instant messaging feature in SL, and experimented briefly with it.

Trends of technical problems, specifically with 3D audio, were evident. Despite the high quality computer systems that were used, and the comprehensive technical support that went into preparing for and running of the studies, audio problems persisted, and were outside the control of the researcher or the supporting LSRI team.

The synchronous nature of classes, and the technical problems faced was however demanding on student attention. Some of them were very tired after a VW class. The VW audio problems faced in both Study-1 and Study-2 deprived participants from a relaxing and effective learning experience. This problem obviously affected participant perceptions and reflections of their learning experience in VWs.

8.5   Revisiting the Research Question

The research question was how well VWs could be used for the effective delivery of language learning as compared to traditional media of learning. In an attempt to answer that question, three studies were conducted, collecting information through several research tools, giving insight into the complex issues involved in such an analysis. Answering the question was found to be tied to several other objectives and

factors discussed next.

- o How well students are computer literate affected how well they would learn with ease through VWs. A student with poor PC skills would not able to benefit from VWs.

- o Student familiarity with VWs dictates how well they are motivated to use it. It was clear after the studies were conducted that more time was needed for training on VWs and for letting participants be more familiar with the interface.

- o Interactivity with the instructor, with learning objects, and with other users makes a large impact on the learning experience. This was evident from student feedback. Interactivity with the instructor was found lacking when compared to face-to-face, and how well interactivity is achieved is how well VWs serve student learning.

- o VWs could allow for interactions useful for language learning should native speakers be available for such interactions. This is a major advantage for language learners, often not available in a face-to-face medium.

- o Interactivity with objects would serve the case of the VW medium better than the face-to-face medium. Objects that produce sound, images, or video according to a certain learning scenario or context would add to the value of VWs in learning.

- o Learning scenarios like role-play activities lend themselves very suited for VWs due to their immersive nature. Role-play activities proved very attractive to participants, and served to set a positive mood for learning.

- o The success of the VW medium in avoiding technical problems is essential for its consideration as an effective learning medium. Audio problems have immensely diminished the effectiveness of the VW medium in learning delivery.

- o The programming of VW objects requires cycles of development before going mainstream in academia. At present, collaboration would be required from the

University IT departments or from graduate assistants to develop contexts and interfaces useful for learning.

o The authoring of VW content needs to be streamlined through a content management process that would allow for easier course management. Otherwise, time and effort would not be available for the average instructor to maintain such content.

o The level of need for learning in VWs in the absence of other learning media would make all the difference in the comparison. Speed and cost of language learning delivery is a factor not to be taken lightly in light of several social dynamics that require this shift from the traditional classroom to online tools and media like VWs.

It could be concluded that given the right conditions or objectives discussed above, a VW medium has the potential to deliver language learning at least as effectively as a face-to-face medium. But if the right conditions were not in place, the comparison would yield inferior results of learning in VWs, as was the case in Study-2. It is however fair to say that technical problems are sorted out new features and tools appear as technology makes progress at a fast rate. It is thus fair to say that the results reached are applicable to the state of VW technology during to the span of time between 2008 and 2013 when this research project was conducted. The lessons learned however in terms of design, methodology, and analysis are applicable to any future research project.

8.6   Evaluation of Methodology

Like any other research methodology, the methodology used in this research project has both strengths and weaknesses.

8.6.1   Strengths of the Research Project Methodology

The overall exercise of putting the methodology and applying it can be considered a

point of strength. The methodology was successful in a number of ways. It allowed the development of design criteria for VWs grounded in literature, and for designing learning spaces and class delivery methods that were used to test and verify these design criteria.

The methodology was able to stick to Design Research guidelines which call for iterative cycles of development of the research process. The methodology approach was iterative as experience was gained from the Pilot to the two Studies, with each Study building on previous Studies, carrying necessary changes in the design, class delivery methods and a number of other areas outlined in each Study.

The methodology set useful and logical patterns for class delivery methods. There was no single research project surveyed in the literature of media comparison studies that was able to deliver the logic behind using patterns of class delivery methods towards reaching a conclusive research result.

The methodology allowed actual courses to be conducted in a controlled method that served for collecting and analysing research data through multiple tools. Both qualitative and quantitative methods were employed in order to shed more light on the research results, since where one method falls short, another method fills in the gap. Triangulation is thus a method-appropriate strategy of founding the credibility of qualitative analyses (Bogdan et. al, 2006).

Bogdan et. al, (2006) states that triangulation is an alternative to traditional criteria like reliability and validity, since the combination of multiple observers, methods, theories, and empirical materials allows researchers to overcome the problems, such as reliability and validity, that arise from single-theory, single method, and single-observer studies.

The methodology also allowed for evaluating the different collected data sets reaching a conclusion in terms of research results. In terms of consistency, the research methodology was always in accordance with the framework set for each Study conducted. The methodology also served for giving answers to the research question, along with a set of supporting useful parameters, and also allowed the formulation of a set of recommendations for different classes of VW users, and for future research work in this area.

8.6.2 Weaknesses of the Research Project Methodology

Design research is not a mature research methodology, and has been criticized as un-coherent in the different tools and methods employed. Another weakness is in the relevance of Design Research description to this project. Design research is conceived to analyse work situations in progress, to access certain research variables. In the case of this research project, the language classes delivered were not part of a language program. They were delivered for the sole sake of determining the affordances and effectiveness of the VW medium in language delivery.

Other weaknesses are shared with any educational research project. The scope of sampling as well as the validity issues, assumptions, and limitations discussed in chapter 3, section 3.2.5, and in Chapter 9, section 9.3 represent a fair and thorough set of issues that could be argued against any methodology similar to the one that was used in this project. However, despite all these issues, one can fairly say that the methodology used in this research project has served its purpose in answering the research question and several other purposes as well in the process.

8.7   Chapter Summary

This chapter evaluated the results of the studies conducted in light of the VW learning space design criteria and the research methods and tools employed. The design criteria

were discussed then recommendations were presented to deal with the different issues that were witnessed. The results of the research tools were then discussed, leading to a critical review of the research question through a set of objectives that would optimize the utility of VWs in language learning. The chapter concludes with an evaluation of methodology used in the research project, highlighting both weaknesses and strengths.

Chapter 9

Conclusions and Further Work

9.1   Introduction

In the course of this research project three studies have been conducted. Data captured and analyzed yielded findings that were discussed in chapter 8. Based on the knowledge acquired from these findings, Chapter 9 outlines a list opportunities and challenges posed by VWs. It does that from three perspectives, the designer's, the tutor's, and the student's perspectives.

A set of limitations is then presented that reflect on the research experience as a whole and on particular events or observations within certain studies. The discussion of limitations thus spans a spectrum of topics and areas including participant selection, the research environment, the VW design environment, and the technical environment to run VW classes with maximal efficacy. The chapter ends with a set of ideas for further research in this area and a chapter summary.

9.2   Challenges and Opportunities of VWs

9.2.1   From a Designer's Perspective

A challenge from a designer's perspective is the ability to balance between the complexity of the learning space and learning objects, their ease of their utilization by tutors and students, and their alignment with opportunities for learning that are specific for VW contexts.

Maintaining this balance is not always an easy task. The opportunities for learning are often rooted in the attractiveness of a VW as a gaming or social environment that brings in many users not necessarily interested in learning. Motivating the large VW user base to shift their attention to the learning dimension of these environments

would take special skills.

The ease of utilizing VWs for learning would necessitate that content management is possible without the need for special programming skills or lengthy work. Providing templates for learning objects that allow tutors to choose their learning objects from a pre-prepared set, and assign or modify the content of these objects is a major challenge facing VW designers today. Tools like content management systems available for website editors do not require more than word-processing skills. Similar tools for VWs would be essential before widespread adaptation by the masses of tutors.

The design should be based on sound pedagogic principles which are rooted in theories of learning and cognition. Having such background requires years of research and experience, and collaboration among designers, and between designers, educators, researchers, and social scientists seems logical for faster cycles of VW learning space development.

Opportunities for VW designers are wide. Their focus should, however, be on the affordances of VWs that give them a niche over conventional media, providing for learning opportunities that are not readily available otherwise, and reaching crowds of users to which these opportunities are often inaccessible. In this capacity, designers go beyond their traditional role of designing learning spaces, and assume some level of policy making and trend setting, driving the crowds into favourable new directions. The shift to VW media should not however be sudden and total. The right mix of VW and traditional media would allow for easier adaptation and wider acceptance. VWs are thus to be treated as supplements, not substitutes to traditional learning media.

9.2.2   From a Tutor's Perspective

Challenges from a tutor's perspective are several. The tutor should manage the

learning process in light of institutional and program requirements, motivate students and convince them of the merit in learning through VWs, manage their learning experience, while providing the right mix between learning media, and this is no simple task. The main advice for tutors would be to collaborate with other tutors dividing the content management and course preparation loads, and to work with designers to inform them what is it they are trying to achieve through the VW, all the while working with students and acting on their feedback to see what works and what does not work for them.

Opportunities for tutors are many. The new dimension of learning that VWs offer has been shown to spark interest in learners, giving them several new opportunities to learn. The tutor should seek and experiment with new teaching tools and methods that work best in VWs.

Livingstone and Kemp indicate that the strength of the VW in learning lies in its ability to allow learner exploration, much like going on a field-trip. They thus see little point in creating virtual classrooms which require synchronous supervision. (Livingstone & Kemp, 2006). Savin-Badin (2010) has condensed a list of pedagogical approaches to learning, along with theories and theorists that stand behind it, and the type of matching activities within the VW SL.

The tutors need to give themselves time to understand the VW environment, look at different ways other tutors have been using VWs, and be ready to do their own experimentation with the environment. A very good reference book written by a practitioner and a designer and manager of a SL island is: 'A Practical Guide for Utilizing Second Life in Higher Education' by Savin-Baden (2010).

9.2.3   From a Student's Perspective

Every new environment comes with its own set of challenges. While online users,

heavy gamers, and VW residents have an advantage for using VWs in education, other students are not far off from utilizing the VW for their learning benefit. Spending time to get familiar with the new environment, managing the identity through avatar personalization, joining groups of SL users are helpful steps to survive the steep learning curve, but once they get familiar with the interface and the environment, a spectrum of opportunities unfolds.

Learning languages anytime, anywhere, with anyone, specifically native speakers, experiential learning, immersed learning, interactive learning, learning through quests, and several other learning opportunities await to be exploited. Table 2.1 of this thesis contains a list of learning opportunities provided by VWs.

9.3   Assumptions and Limitations

9.3.1   Assumptions

Several assumptions were made in the course of conducting the research Studies. While allocating participants across groups, it was assumed that participants would commit till the end of the studies. This was not the case for the Pilot Study and Study-1. Study-2 participants were paid to complete the Study.

Participants were assumed to be motivated enough to complete all study components, including pre-tests, surveys, and assessments. The witnessed facts were however contrary to that assumption. Some Study-1 participants were quick to complete the language aptitude test (MLAT) without taking much thought of it. Most participants did not comment on the survey questions, even when asked to comment. Moreover, it was impossible to determine that participants did their best on class assessments, and to what extent each of them had prepared for the assessments. It was also uncertain whether students understood the survey questions clearly, and how truthful and extensive they were in responding to surveys and interview questions.

These uncertainties could have affected the research results. It was however safe to assume that these effects would, to a large extent, be evenly distributed across treatment groups in such a way that the relative results of media assessments would still be valid.

9.3.2 Reference Medium

The assumption was made that the face-to-face medium was a reference for language learning, and hence the comparison between the VW medium and the face-to-face medium would constitute a valid measure of the effectiveness of the VW medium. While such an assumption could be valid, there is no other reason to assume that face-to-face language classes could constitute an ideal reference for other media but the reason of its widespread adoption and popularity.

9.3.3 The Research Dilemma

As a media comparison study, a major requirement of the research project was fairness in comparison between media. This requirement necessitated similarity not only in treatment groups, but also in class structure, content, and class delivery models and methods. On the one hand, investigating the VW medium for learning would require that unique features and affordances of this medium be thoroughly tested. On the other hand, delivering learning through unique medium activities and features would give that medium the advantage over the other medium with which it is compared while comparing learning outcomes such as assessment results of two media in a fair way.

While fairness in comparison was maintained as much as possible during the studies, it was necessary to utilize certain possibilities and advantages in the VW which could not have been utilized through a face-to-face classroom, such as role-play areas, and practice areas that were available for students all the time. This feature was appreciated by students, and could constitute a major motivation for them to use VWs

in their language learning.

9.3.4   Validity Issues

While analyzing the data, validity issues were taken into consideration. Internal validity is defined as the degree to which the design of an experiment controls extraneous variables (Borg et al., 1993). Such variables may be external events during the intervention period that influence results. Several such events were described in the Pilot Study and Study-1 that have led to student dropout.

The inclusion and distribution of participants across groups was a factor that contributed to the validity of research results. An aptitude test was utilized to distribute students across Study-1 groups in a way that minimizes the effects of dropouts. Paying Study-2 participants only if they completed the study could have had a negative effect on the validity of results. The motivation of participants to join the study could have been financial, and it was not clear if and how this could have affected the validity of results. However, from observation, it was obvious that Study-2 participants approached the learning activities with openness to learn and did not waste time, and hence the validity of their assessments and evaluation stands.

Scoring assessments and reviewing class videos while performing the critical incident analysis are potential sources of bias if not objectively performed. In qualitative research approaches, the researchers are the research instruments (Frankel et al, 2000). The researcher characteristics would thus have an influence on the research results. In order to diminish this influence, the researcher must understand his/her personal characteristics and must reflect on how they may create bias that may shape the research results. Ideally, a second researcher (or more) would review all the research data which are subject to researcher bias. This was however not possible during this research project. Only Study-2 assessments have been re-rated by another researcher to maintain validity of assessment scores as indicated in section 7.4.3.

Researcher bias may be the reason why many of the criteria for evaluating qualitative research are designed as checks and balances for researchers and their relationship to the research subjects. On the other hand, having several research tools in a qualitative study, and using quantitative research tools to supplement qualitative research tools during this project, have allowed for triangulation and helped avoid such researcher bias.

9.3.5   Issues with the Cross-Over Class Delivery Model

An issue with this model is the 'order' effect. It is possible that the order in which interventions are administered may affect the outcome. This is because language skills are carried-over between learning interventions through different media, so even with an assessment carried after the first intervention, the assessment of the second intervention might reflect the successes or failures of the first intervention in learning delivery. Carry-over effects might be avoided or diluted with a sufficiently long 'wash-out' period between interventions, and such a period might not always be available for the research study, such as the case with Study-2 that was conducted over three days. However, the analysis of data collected from several sources minimizes the effects of this issue. When several research tools are employed, a much bigger picture is painted of the research results, removing any doubt of the validity of the results.

9.3.6   What are we measuring?

After a survey of research in the areas of cognition (cognitive load theory) and coding (dual code theory) and later models of learning through media that builds on it, Jenkinson (2009) indicates traditional methods of measurement fail to capture the complex interactions that occur between learners and the subject matter. In the same article, Jenkinson states that multimedia environments tend to be highly complex, due to a number of interacting variables, and this poses a significant challenge when one

attempts to assess the impact of educational technology upon learning.

It is important to ascertain that this research project strived to measure the benefit of VW in learning. It did so by assessing the extent of learning this medium is producing as compared to other more traditional media. It does not however assess how the participants are interacting with the medium or how the learning is taking place, which tends to fall under cognitive psychology research.

9.4   Further Work

9.4.1   Other Class Delivery Models

A combination of the class delivery models would be appropriate for further studies. This model is called the modular-sequential model. A typical lesson in Study-2 contained three or four activities, and the lesson was delivered as a whole in each of the media used. The proposed model for Study-3 is based on the same activities used for study-2, but it allows switching between media after a module of two activities, hence the name modular-sequential. For example, the activity of learning a set of 10 words (vocabulary) in the Arabic language would be performed in the face-to-face medium, and another set of words with similar difficulty would be delivered to the same group of participants through the VW medium. A quick measure of how many words retained through each medium would allow for a more modular and detailed comparison of the strengths and weaknesses of the VW medium as compared to the face-to-face medium.

This concept could be extended to all aspects of language learning. Pronunciation of one problematic Arabic letter would be done in one medium, and then pronunciation of another problematic letter in the other medium. Both the instructor and the person performing the activity would be able to observe and compare the differences and the similarities of the media and better assess the effectiveness of the VW medium for

language learning.

Although the modular-sequential model would require more work in switching media during mid class, with the complexity of video recording all activities in such a scenario, it could be a good opportunity to utilize the resources available for the study in the most effective manner, and would allow for the collection of research data that would be much useful for the comparative analysis by involving participants in evaluating the medium when it comes to specific language learning tasks. If such model is applied, five to seven participants should be adequate for the study.

9.4.2   The Direct Research Approach

While it is necessary for a comparative study to align methods and teaching processes across media being compared, an evaluation study of a medium by itself need not make this alignment, and would allow for exploring the medium to its full potential for learning. This would be a contextualized study that focuses on the features a VW can exclusively offer. The VWs were proven to offer a spectrum of benefits for learning. Designing research experiments that exploit these benefits would reveal more information on the affordances of VWs as a learning medium.

Such research need not follow conventional teaching structures, but would follow the learner style and situation more closely. For example it would work with participants who are already users of VWs or other online language learning technologies rather than with general users who are mostly used to conventional learning media and techniques. However, since the majority of language learners, including those who use online learning, have went through some form of structured language learning activities, the comparison between VWs and conventional media is inherent and simple, as the participants would unconsciously compare learning through the new media with their past conventional language learning activities.

9.4.3 Special Needs Participants

There are large groups of users who have no other or limited alternatives to language learning, and who are in need of such learning for several social and economic reasons. Seeking such groups would serve to evaluate a sample of highly motivated learners. As explained in Chapter 1, many such groups exist that are deprived of structured and consistent language learning. Starting the research with such a group of learners would go far in determining the effectiveness of VWs in language learning.

As explained in section 2.2, large communities of millions of language learners are resorting to online language learning communities through providers such as Livemocha and Busuu. It was also noted in section 2.4.2 that several commercial and non-commercial providers are offering language learning inside the VW Second Life such as the language village and the British Counsel. It would be worthwhile and very beneficial to conduct a joint research project that exploits the unique features of these media, as well as the qualities of the use-base of these providers, mainly characterized by need, and high motivation to learn languages.

9.3.4 Technology Innovation

The VW medium is certainly able to deliver learning, but lacks a lot of properties inherent to a face-to-face classroom. While a lot of features are available in SL, there remains a significant effort to bring the technology forward to a point where the comparison is reasonable. SL 3D voice technology, for example, is far from perfect. Graphics are convincing but not convicting. Moving an avatar around is limited by a restricted field of view, etc. The SL VW is an unfair representative of the affordances of VWs.

A head-mounted display could bring the immersive feature of VW technology to life. Eye-tracking software could be interfaced with the SL client to facilitate the visibility and widen the field of view. Other haptic devices could tie avatar actions to those

steering them. VW technology still has a lot of room for innovation before bringing the virtual world experience into the real life that we live, and vice versa.

9.3.5   Unique Applications

As VWs are immersive, and as learning by experiencing, exploring, and collaborating, is part of potential learning scenarios of VWs, overlaying a real-world geographic layer on top of the VW, with photos and animations of real landmarks would constitute a major improvement in VWs language learning.

Further work could thus involve the idea of connecting the geography detail to the VW. In the summer of 2005, Google released Google Earth enabling users to navigate their way through satellite or airplane imagery and extensive geographic data. Few months later Google Earth started to be used as a tool to support fictional universes and games, one of which is Google Earth Wars, where thousands of players would choose to make virtual army bases in real world locations, with their bases showing up on all other player's copies of Google Earth, allowing them to interact with one another from within the Google Earth interface.

The experience derived from playing such a game through Google Earth will naturally teach geography, and by creating game worlds out of satellite imagery of foreign cities from the target culture, students could be familiarized with foreign geography, city landmarks, etc. The same experience could be extended to language learners where students could virtually visit any city or landmark to have a first account of its culture and flavour. The immersed experience would only serve to deepen the understanding and enhance the language learning experience.

9.5   Chapter Summary

Building on the research findings, the chapter outlines a set of challenges and opportunities that a designer, a tutor, and a student would face while learning

languages with VWs. The chapter goes to discuss limitations of the research studies, as well as the shortcomings of the research environment in general, and how these limitations and shortcomings were managed. The chapter concludes with ideas for further research work on language learning in VWs.

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Appendix 4.1　　　　Participant Information Sheet and Consent Form

Virtual Reality in Language Education
University of Nottingham - LSRI
March 6th 2007

Why do this study? The project goal is to explore the possible applications of Virtual Reality (VR) and Visualization technologies in the enhancement of language education, in order to propose and construct/adapt a possible application/platform that would prove efficient and practical.

What will participation involve? This research involves a comparative study between VR and Video Conferencing (VC) technologies in the form of an inter-cultural language class using both media to explore critical incidents related to the VR technology and to set the stage for later research

How long will participation take? The Arabic language class should require anywhere between 6 to 9 contact hours for each media type (VR or VC). Each student would only need to participate in one of the two technologies.

Statement on Ethical Conduct during this Research: This research process shall abide by ethical principles and guidelines for conducting research at the School of Education in the University of Nottingham, which are in accordance with the British Psychological Society Code of Conduct, Ethical Principles & Guidelines (2001) pages 9-14, section on Ethical Principles for Conducting Research with Human Participants, and which are also in accordance with the Revised Ethical Guidelines for Educational Research (2004), pages 1-13, of the British Educational Research Association.

Student Declaration: As an informed participant of this experiment, I understand that:
My participation is voluntary and I may cease to take part in this experiment at any time, without penalty.
I am aware of what my participation involves.
There are no risks involved in the participation of this study.
All my questions about the study have been satisfactorily answered.
I have read and understood the above, and give consent to participate:

Participant's Signature:_____　　Date:_____
Researcher's Declaration: I have explained the above and answered all questions asked by the participant:

Researcher's Signature: <u>Riad Kaisar Saba</u>　　　　　Date: <u>March 6th, 2007</u>

Appendix 4.2   Lebanese Arabic Language Lesson 4

Lebanon On-Site Scenarios: First day in Lebanon
8-5-2007

After reading the translation reference table for each scenario, translate the following set of sentences to Lebanese Arabic. You are encouraged to work in groups of 2. Each group is asked to pronounce a translated sentence or more to the class

<u>Scenario 1: At the Airport (matār)</u>

Translation Reference Table

Where are you going?	la wen rayeĥ?
What is your nationality?	šu jinseytak?
I'm tired	ana te'ban
I'm coming from London	ana jéyé men lundun
He's going to Beirut	houé rayeĥ 'ala Bayrot
She's going to Tripoli	hiyé rayeĥa 'ala Trablos
Here is the passport	tfaddal 'el basbore
Luggage	Chanat
Taxi	Taxi
Visit	Zyara
How much to the Hotel?	eddeš 'al otel?
British	Britani
English	Inglisi
Slow down	'a mahlak

Practice: Translate the following sentences into Lebanese Arabic:
o Slow down please, I am tired.
o Do you speak English? I can speak Arabic.
o I am going to Tripoli. How much to Tripoli (cost)?
o Where is the luggage?
o My nationality is British. I am coming from Nottingham.
o This is my first visit to Lebanon. Is there another (second) airport in Lebanon?

<u>Scenario 2: At the Hotel</u>
Translation Reference Table

Hotel	Otel
Few days	kam yom
Sea-view room	'ouda 'l baĥer
Staying	ba'y
Dinner	'aša
Lunch	Gada
Now	halla'
Breakfast	terwe'a or fotour
7 o'clock	'esse'a sab'a
Swimming pool	Masbaĥ
To sleep	Nām

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Towel	Manšafe
To go	Rouĥ
Lebanese	Lebnani
What time or when…?	emta?
I like to	Bĥeb
I want (to)	Baddi

Practice: Translate the following sentences into Lebanese Arabic:
- o What time is dinner serving?
- o Where is the swimming pool?
- o I want 3 towels in my room.
- o Are you Lebanese? I am English.
- o Is my room sea-view?
- o I am staying for a few days.
- o I like to sleep now.
- o Do you want to go to the Cinema?

Scenario 3: At the Restaurant
Translation Reference Table

Table for 2 please	tāwle la tneyn please
Hungry	Jiān
Thirsty	ʻetšān
Water	My
Best Dish	aĥsan saĥen
Very tasty Lebanese salad with wheat	Tabboleh
Very tasty Lebanese salad with bread	Fattouš
Do you want appetizers?	baddak meza?
Very tasty spread with chick peas	ĥommos
He wants to eat grilled meat	baddo yékol mašāwi
She wants to drink beer	badda tešrab bira
Do you have potatos?	ʻndak batata?
Fruit	faweke
Vegetables bowl	jaṭ xedra
Bill	ĥsāb or fetoura

Practice: Translate the following sentences into Lebanese Arabic:
- o I am hungry.
- o Are you thirsty?
- o Do you want to drink beer?
- o I want to eat fattouš.
- o Do you have mašāwi?
- o What is your best dish?
- o I want some water please.
- o One vegetable bowl please.
- o Give me the bill please.

Scenario 4: At College
Translation Reference Table

At College	bel jem'a
A teacher (masculine)	m'allim or estāz
A teacher (feminine)	m'allmé
Where is the book	wen le ktab
I want a copybook	Baddi daftar
This pen	Hayda el 'alam
This pencil	Hayda 'alam le rsās
Back pack	Šanta
He wrote	Katab
Library	Maktabé
I am speaking	ana 'am beĥki
I have a class now	'ndi saff halla'

Practice: Translate the following sentences into Lebanese Arabic:

o   I am speaking Arabic.

o   Are you reading Arabic yet?

o   Where is the back pack?

o   I want a good book from the library.

o   Are you in class tomorrow?

o   Is there school the day after tomorrow?

o   This book is the third I read this week.

Essay

Write a small Arabic letter to an Arabic friend describing your first day in Lebanon.

Appendix 4.3   Class 3 Notes

Virtual Reality in Language Education
PhD Pilot Project
Class 3 Notes
Class held on 1-5-2007
By Riad Saba
7-5-2007

Overview and Purpose
This is session 3 of 6 aiming at delivering an Arabic class for the sake of investigating VC and VR technologies in language technologies

Session Minutes
1 PM BST   – Section 1 students arrive at the classroom
1:05 PM BST – Mr. Saba delivers the first Arabic lesson
1:55 PM BST – Section one class is completed
2:00 PM BST – Section two students arrive in the classroom
2:05 PM BST – Mr. Saba delivers the second Arabic lesson
2:55 PM BST – Section two class is completed

Class Attitude
There was a good turnout. 7 students showed up for section 1, and 3 students for section 2, with one more student expected to join section 2. The students that showed up had a generally positive attitude towards the course. All 24 students who showed up for the first session have been contacted by email during the previous week. All students were given the class notes for class 3.

Pedagogical Issues
  o Good feedback: the instructor was able to associate names with faces which allowed for better class interactivity and collaboration.
  o The instructor did not use the PC screen since all students had handouts. The white board was used once. This was necessary since there was no one in the room to assist the instructor in switching between the PC projection and the video.
  o The small class made it easier to actively engage all the students in class activities.
  o The material delivery rate was fairly fast and the material previously emailed and/or handed out was covered.
  o The students were showing better command of Arabic pronunciation and more confidence in speaking the new language
  o Students were more actively involved in the class discussions as evident by the many questions that they asked

Technology Related Issues

The audio and video quality was acceptable. Different whiteboard collaboration scenarios/tools need to be tested, but are not readily available.

Notable Successes
- o The classes were delivered successfully.
- o Students showed better command of Arabic pronunciation
- o Student involvement improved considerably

Critical Incidents

Following are the events that contributed positively or negatively to the conduct of the lesson:

Positive Incidents:

- o After breaking the class into 2 sections, the small class allowed students to better-engage in class activities
- o Students were enthusiastic to learn Arabic
- o The entire class notes were covered after reviewing all previous work done
- o The video quality was very good

Negative Incidents

- o The audio connection delay, although small, somewhat hindered the instructor from immediately correcting student miss-pronunciation who carried reading the next statements and then back-tracked to correct their spelling of previous words.

Areas of Improvement

- o Need for a tool to write in a free-hand manner on a transferable media
- o Allowing more class activities to take place without the instructor's intervention
- o Using different learning scenarios and investigate its consequences on the learning process

Appendix 4.4   Pre-Study Attitude Survey with Results

University of Nottingham
PhD Research - Virtual Reality in Language Education
Language Class Attitude Survey
19-3-2007

The topic of my PhD research is the use of virtual reality (VR) in language learning. This attitude survey is used as a tool to compare the use of VR technology with traditional classroom language learning methods simulated through video conferencing, in order to validate the potential for VR and to qualify the key parameters of the comparative study.

The information extracted from the attitude survey will only be used for this research. The survey forms will only be seen by me and my supervisors.   There will be no inclusion of any information in reports associated with this research that might identify individual people participating in this research.

We hope that this type of interaction would give a solid ground for the VR in language education research. We thank you for the time you spend in filling this attitude survey, and we hope that you would be able to benefit from this course.

Riad Saba

Results
24 participants filled the pre-study attitude survey. Following are the information extracted from the attitude survey, along with student comments. Numbers of students who produced a certain response are included next to response in brackets.

Section I: Participant Information

a. What is you Name?   Research ethics guidelines require that participant personal information is kept confidential.

b. What is your gender?   Male [11 students]   Females [13 students]

c. Age: 20-29 [23 students]   30-39 [1 student]   40-49   50 and older

d. Education level:
22 students were studying at the MSs level, one at the BSc level, and one was a PhD holder working for the University of Nottingham (UoN).

e. First Language: [English 13]   [German 4]   [French 3]   [1 each: Indonesian, Uzbek, Vietnamese, Russian]

f. Second Language: [N/A   7]   [English 11]   [French 4]   [Spanish 1, Russian 1]

g. Exposure to second language education: *(Tick all that apply.)*
1. Learned second language at home   [11]
2. Learned second language at elementary school [9]
3. Learned second language at secondary school [21]
4. Learned second language in College [12]

h. Level of ability in Arabic Language as a second language
1. None [21]
2. A few words   [3]
3. Can write and/or speak simple sentences
4. Can speak and write Arabic

i. Arabic Language Spoken Dialect *(Tick any that apply.)*
1. None [22]
2. Modern Standard Arabic (Spoken throughout the Arab World)   [2]
3. North African Dialect (Algeria-Morocco-Libya)
4. Egyptian Dialect
5. Gulf Dialect (Saudi Arabia, Kuwait, UAE, Bahrain, Oman, Qatar, Yemen)
6. Levant Dialect (Lebanon, Syria, Jordon)

Section II: Attitudes Towards Language Education

DIRECTIONS: The statements in this survey section have to do with your opinions and beliefs about language learning and its importance. Please read each statement carefully, and circle the number that best expresses your feelings.

To what extent do you agree or disagree with each of the following statements about language Education? (*Circle one number on each line.*)
Strongly Agree --------- SA
Agree ---------------------A
Not sure ------------------N
Disagree ------------------D
Strongly Disagree ------SD

1. Learning a foreign language should be a college requirement.
SA [12] A [5]   N [3]   D [4]   SD

Comments :
-        One student commented that this should depend on the program type.
-        Two students commented that learning a foreign language should start in schools, not college. One of these 2 students was a PhD holder working for UoN.

2. There is no need for me to learn another language.

SA   A   N   D [6]   SD [18]

3. I have never considered learning another language before.

SA [1]   A   N [1]   D [5]   SD [17]

4. Learning another language is too hard.

SA   A [3]   N [5]   D [9]   SD [7]

Comments: One student commented that it depends on personal qualities and talents.

5. Learning another language would help my English.

SA [3]   A [4]   N [8]   D [3]   SD [6]

6. A second language is part of an educated person's make-up.

SA [7]   A [10]   N [5]   D [2]   SD

7. Another language can help me think and analyze better.

SA [12]   A [8]   N [4]   D   SD

8. Learning another language enhances my religious experience.

SA [1]   A [5]   N [8]   D [2]   SD [8]

Comments: One Student commented that he is not religious

9. Learning another language will help me understand its culture better.

SA [14]   A [10]   N   D   SD

10. I need to learn a foreign language to enhance my prospects for a future career.

SA [11]   A [11]   N [2]   D   SD

11. I do not like to travel abroad and hence I do not need another language.

SA   A   N   D [6]   SD [18]

12. Any business today has to think globally, hence a second language is necessary.

SA [10]   A [11]   N [3]   D   SD

13. Another language would allow me to meet more girls/guys

SA [3]   A [10]   N [7]   D [3]   SD [1]

Comments: One female student said that acquiring a new language could help avoid meeting new people in some undesirable circumstances.

14. I only need to learn a few basic words and phrases of another language

SA   A [1]   N [4]   D [13]   SD [6]

15. Overall I think it is very important to speak another language

SA [15]   A [7]   N [2]   D   SD

Section III: Attitudes towards Educational Media

To what extent do you agree or disagree with each of the following statements about language Education? (*Circle one number on each line.*)

Strongly Agree --------- SA

Agree ---------------------A

Not sure ------------------N

Disagree ------------------D

Strongly Disagree ------SD

1.   I have not taken classes through large-screen video conferencing before.

SA [15]   A [6]   N [1]   D [1]   SD [1]

2. I have used Desktop video conferencing, like web cams, before

SA [4]   A [6]   N [1]   D [7]   SD [6]

3.   It will be harder to learn a language by videoconference than with a traditional classroom.

SA   A [7]   N [14]   D [3]   SD

Comments: One student taught French in Japan through videoconferencing. Another commented that the degree of difficulty will be dependent on how well technology is advanced.

4. I am not comfortable working with educational technology like e-learning.

SA   A [2]   N [12]   D [4]   SD [6]

5. I need more effective tools for learning a new language since the traditional classroom is not effective.

SA [3]   A [8]   N [9]   D [2]   SD [2]

6. I have used computer technology to learn a new language in the past.

SA [2]   A [8]   N [1]   D [8]   SD [5]

7. I am excited about the technology-based Arabic learning class.

SA [12]   A [11]   N [1]   D   SD

8. I am not confident of my ability to learn a new language through technology

SA   A [3]   N [9]   D [10]   SD [2]

Appendix 4.5   Post-Study Attitude Survey with Results

University of Nottingham
PhD Research - Virtual Reality in Language Education
Language Class Post Assessment Attitude Survey
7-6-2007

This is the post-assessment attitude survey for the PhD research pilot project on the use of VR technology in language learning. The survey will be analyzed in light of the initial attitude survey filled at the beginning of the pilot project in order to validate and qualify key parameters of the study.

The information extracted from the attitude survey will only be used for this research. The survey forms will only be seen by me and my supervisors. There will be no inclusion of any information in reports associated with this research that might identify individual people participating in this research.

We hope that this type of interaction would give a solid ground for the VR in language education research. We thank you for the time you spend in filling this attitude survey, and we hope that you were able to benefit from this course.

Riad Saba

Results

Seven participants filled the post-study attitude survey. Following are the information extracted from the attitude survey, with comments. Numbers of students who produced a certain response are included next to response in brackets.

Section I: Participant Information
-          What is your Name?
Research ethics guidelines require that participant personal information is kept confidential.

-          Number of sessions attended: Circle one number below:
1   2   3 [1 student]   4 [4]   5 [2]   6

One student attended three sessions, four students attended four sessions and two students attended five sessions.

Section II: How did the Arabic language class meet your expectations?

(Circle one number on each line according to the legend below. Please make a comparison with your expectations before the start of the course)

Much better than expected --------- 7
Better than expected ----------------- 6
Little better than expected ---------- 5
Neutral -------------------------------- 4
Little worse than expected ---------- 3
Worse than expected ---------------- 2
Much worse than expected --------- 1

1. The amount of content delivered in the class

7	6 [4]	5	4 [2]	3 [1]	2	1

Comments:
- Once the class sizes reduced, the amount of content improved.
- Good range of vocabulary covering different topics.
- Possibly felt a little rushed at times, I got the sense that we learned to repeat what was written on the handouts without actually learning what we were saying.

2. The sense of presence in a real classroom

7	6 [2]	5 [2]	4[1]	3[1]	2 [1]	1

Comments:
- Video quality and time delay hampered discussion.
- Felt like a real classroom

3. The interactivity with the instructor(s)

7	6 [2]	5 [4]	4[1]	3	2	1

Comment: Generally very good, but some difficulty with sound quality.

4. The difficulty level in learning a new language through this medium as compared to a traditional classroom-based language class

7	6	5 [1]	4 [5]	3 [1]	2	1

Comment:
- I expected this medium to be much more difficult than traditional learning. This view has not changed.
- For me there wasn't much difference.
- Quite difficult
- With better communications technology it would have been better, but poor picture quality, poor sound and time delays did not help.

5. Your command of the Arabic language after the class

7   6 [1]   5 [4]   4   3 [2]   2   1

Comment:
- I have picked up more than I anticipated.
- I did not expect to learn much, but the time of year that we took this class made it difficult to make the best out of the lessons (i.e. practice at home)

6. The practice exercises delivered during the class
7 [2]   6 [1]   5 [2]   4 [2]   3   2   1

Comments: These were good fun. The instructors made sure everybody had practice with the exercises.

7. The instructor's ability to teach the class through this medium
7 [2]   6 [2]   5 [1]   4 [2]   3   2   1

Comments: Quite difficult to get the same sort of interaction as in a real clasroom

8. The quality and relevance of class material
7   6 [3]   5 [3]   4   3 [1]   2   1

Comments:
- Interesting Discussion. However was more concerned with random vocabulary. Thus I find constructing sentences very difficult as there was little focus on preposition/verb conjugations etc.
- In aiming to teach us the basics of Arabic for a trip to an Arabic speaking country the class material was very relevant.
- Needed more help for the spelling of different words
- Would have been better to get to grips with the basics early on- e.g. greetings, numbers etc. Rather than learning seemingly arbitrary statements.

9. Your understanding of the Lebanese culture after the class
7   6   5 [1]   4 [3]   3 [3]   2   1

Comments :
- It was not discussed
- The instructor told us bits and pieces of Lebanese culture which was interesting
- Not really about the culture, but a bit.
- It improved a little, but not a great deal, however I was not expecting to learn much ; hence the '4'

10. The general class atmosphere
7 [2]   6 [3]   5 [2]   4   3   2   1

Comments:
- Small classes are better
- Everybody seemed to want to learn, and I enjoyed the informal discussions between us and the instructors. It was relaxed and enjoyable.

11. Your interest in learning the Arabic language after the class

7 [2]   6 [5]   5   4   3   2   1

Comments :
- I enjoyed it
- May be one day
- I would be keen to improve on what I have learned, though would choose mroe conventional teaching methods.

12. The direct delivery teaching method utilized in the classroom

7   6 [3]   5   4 [4]   3   2   1

Comments :
- Direct Delivery/Role Play are useful teaching methods but were hampered by videolink medium.
- Good balance between methods. The handouts were very useful.

13. The role play teaching method utilized in the classroom

7 [1]   6 [1]   5 [2]   4 [2]   3 [1]   2   1

Comment: Again, the role play situations seemed to involve us reading from a list and attempting to pronounce what was written correctly, rather than fully understanding and learning what we were saying. A slower pace may help in this regard.

14. The ease of the Arabic language

7   6 [2]   5 [2]   4 [2]   3   2   1 [1]

Comments :
- Difficult, as expected
- Very difficult
- Not very difficult for me because my mother tongue is turkish
- It was hard, but I expected it to be hard.

15. The importance to speak the Arabic language

7 [1]   6 [1]   5 [1]   4 [3]   3 [1]   2   1

Comments:
- I still feel it is important – particularly in relation to my degree (International Security and

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Terrorism)
- Would be very useful in some circumstances for career prospects.
- Useful, but far from being important

16. The technology tools used in support of the class

7 [2]   6   5 [2]   4 [2]   3   2 [1]   1

Comments:
- Email was fine. LCD was poor at times.
- LCD projection and audio were generally ok, was sometimes a bit unclear. The whiteboard was useful. The computer use for a couple of sessions was also helpful.
- Technological flaws were certainly one of the main problems

Section III: General Comments.

Please answer the 5 questions below and give explanations and/or examples where possible:

Each question is followed by the statements that the students made.

1. How different was the learning experience from that of a traditional classroom?

Statement 1: The video conferencing was definitely a new experience for me but it actually wasn't that bad at all

Statement 2: There was not much of a difference for me. Although Riad (the PhD researcher) was not physically in the room, he led the class and delivered very good lessons.

Statement 3: It was very different, but rather in a negative way because we couldn't see the mouth of the speaker when pronouncing words, we couldn't see the board and couldn't ask as many questions as we wish; due to the slow connection.

Statement 4: Very Different: Less ability to interact, harder to hear specific sounds, no visual aids on whiteboard as picture quality was poor

Statement 5: Quite similar. Slightly less interactive.

Statement 6: It was hard to see the white board behind the teacher and the writing on it. Furthermore, one had to speak rather slow and very clearly in order to have the other party understand. Sometimes there were little problems with the connection.

Statement 7: Similar overall experience, and I enjoyed the novelty of being taught directly from Lebanon, though I would choose it over a traditional classroom for the best learning conditions.

2.	What were the success areas for the video conferencing medium?

Statement 1:	The interactive parts. When the teacher could speak to all the students in the class unlike the initial class where there were too many people and communication was a little harder.

Statement 2:	The chance to talk to native speakers. The interactivity was similar to an ordinary classroom.

Statement 3:	Having the opportunity for distant learning by somebody who is abroad. Time savings for the teacher.

Statement 4:	Being able to be taught directly from Lebanon

Statement 5:	Having a native speaker teach us directly from Lebanon was good.

Statement 6:	Students are very quiet so they can hear the teacher, therefore they were more concentrated as well.

Statement 7:	Main benefits were more cultural, and I believe there would be potential for constructive cooperation and interactions with students in Lebanon in the future. Yet as an educational tool it was flawed.

3.	What are the aspects of difficulty in learning the Arabic language by videoconference? What could be most improved?

Statement 1:	The material and articulation. I wasn't always sure that my pronunciations were right because at times it was difficult to hear

Statement 2:	The video quality was not very good sometimes but that was already successfully addressed by giving us handouts.

Statement 3:	The most improved thing could be the connection, if it had been faster, we wouldn't have had the troubles I mentioned. However, if the language was not Arabic, but a Latin originated one, the students would be more successful because most of them were Europeans used to Latin pronunciation and spelling.

Statement 4:	It was hard to hear specific sounds and spellings. Would be easier if instructor write vocabulary used in the lesson on the whiteboard but video quality should be first improved.

Statement 5:	More consistency in quality of sound would be beneficial as it was sometimes quite difficult to understand that instructor.

Statement 6:   Sometimes the pronunciation was not understood correctly due to connectivity problems. The white board could not be seen very well in the video conferences.

Statement 7:   Better sound and video would allow for easier communication. For instance, the time delays made it difficult to ask questions, while poor picture quality made it hard to read what had been written on the white board.

4.   Would you like to and/or recommend to take language classes through large-screen video conferencing? Desktop video conferencing? Any other technology-based method? Please explain why or why not.

Statement 1:   Sure would do it again but as mentioned previously; I'd prefer it with a much smaller crowd.

Statement 2:   Definitely would recommend language classes through video conferencing because it worked for me. The lessons were huge fun and I really enjoyed the experience. There was no inhibition felt because of the videoconferencing.

Statement 3:   I have no idea, unfortunately I'm not really into these topics ☺

Statement 4:   I prefer traditional based language learning. It is easier to interact, to hear pronunciation, and to get one-on-one help.

Statement 5:   It certainly has potential, but I think some problems need to be ironed out with the connection.

Statement 6:   I would take another video conference class but only with improvements of the things mentioned above: clearer connection and a white board that is visible easily.

Statement 7:   If the class was similar to the Arabic languages I took then no. However it does have its virtues, and with the aforementioned improvements I suggested I believe this situation could change.

5.   How would you describe your confidence in using the Arabic language after this class? Are you ready to open a conversation with an Arabic- language native speaker that knows no English?

Statement 1:   Some-what confident

Statement 2:   I learned the basics and even practiced with my friends. My confidence is quiet good given that we just had a few classes.

Statement 3:   I feel quite confident (may be not very much with the pronunciation). Even

though we couldn't learn deep into grammar, we learned the basic things to help us in such a case, and I believe we can build more on it.

Statement 4:   Not confident. I could get by in some situations but I am not sure that I would understand when spoken to.

Statement 5:   I would struggle to open a conversation with an Arabic language native

Statement 6:   I am definitely not very sure in using the Arab language except for often used phrases. I think for being able to become more confident in speaking the language, I would have to have the classes over a longer period of time.

Statement 7:   No, not even close. Need a lot more than 6 one-hour lessons to be able to hold a conversation!

General Comment: I think the timing of the course was unfortunate, in that I did not have enough time to do the homework or to practice before each session.

Appendix 6.1   **Study-1 Projected Time Table**

If all the conditions for the PhD research Study-1 are assembled in place, the project is due to start before the end of September 2008 and due to end by the mid November 2008. Following is a tentative time table, noting that official UK holidays must be observed in this time table:

Date	Activity	Remarks
Week of Monday September 29th, 2008	Initiation meeting: Introduction Aptitude test Attitude Survey Consent form Brief introduction	- This would be a general meeting for all participants. - For the sake of the VR group, it might be best for the PhD researcher to remain autonomous at this point, so someone might need to coordinate the initiation meeting.
Week of Monday October 6th, 2008	1st Arabic language session – Short Reflection session	For all three groups
Week of Monday October 13th, 2008	2nd Arabic language session	For all three groups
Week of Monday October 20th, 2008	3rd Arabic language session – Short Reflection session	For all three groups
Week of Monday October 27th, 2008	4th Arabic language session - Short assessment	For all three groups
Week of Monday November 10th, 2008	55th Arabic language session	For all three groups
Week of Monday November 17th, 2008	6th Arabic language session – Short Reflection session	For all three groups
Week of Monday November 24th, 2008	Final language Assessment and post Attitude survey	For all three groups

Appendix 6.2   Participation Expression of Interest Form

Lebanese Arabic Language Course
University of Nottingham - LSRI
September 22ⁿᵈ, 2008

To whom it may concern:
I hereby declare my interest in participation in the Lebanese Arabic Language course that will run in October and November, 2008 at the University of Nottingham Learning Sciences Research Institute (LSRI), Exchange building, Jubilee campus. I reserve the right to change my mind with no obligation whatsoever.

Participant's Signature:_____   Date:_____

Researcher's Declaration: I have explained the course details and answered any questions asked by the potential participants:

Researcher's Signature:_____   Date: September 22ⁿᵈ, 2008

Appendix 6.3   Information Sheet for Participants

Spoken Lebanese Arabic Language course
17-8-2008

Dear student:

In the course of conducting a PhD research study for investigating the effectiveness of Virtual Worlds technology in Language Learning, it is with delight that I invite you to participate in a complementary Arabic language 'taster' course due to run at the University of Nottingham (UON) in October and November, 2008.

The Spoken Lebanese Arabic language course would be delivered by myself. I am the PhD researcher Riad Saba, an Arabic language native speaker, and I would be based in Nottingham for the period of the research study. I plan to deliver the Language class through 3 different media of instruction, a normal face-to-face classroom, a video conferencing facility, and a Virtual World called Second Life. The course initiation meeting is scheduled for Friday October 3rd, 2008. The Arabic learning activities shall start in the following 2 weeks, and would run for 7 to 8 weeks, at a rate of one 80-minute session per week. Wednesday afternoons starting at 2 PM would be the most likely time to conduct the Arabic lessons. Final schedules would be confirmed upon consultation with you.

At the start of the course, you would sit for a language aptitude test to measure your ability to learn a new language. You would also be asked to fill a pre-study attitude survey. You would then be placed in one of three homogeneous groups of language learners, an each group would be learning through a different media. Group and individual interviews and learning assessments would be periodically conducted to reflect on your attitudes towards the course and the media of instruction used. At the end of the course in mid to late November, a final assessment of learning outcomes would be performed through a unified language test and a post-assessment attitude survey.

The data generated would be analyzed qualitatively and anonymously, protecting your identity, and preserving any personal information that was collected during research activities in strict confidentiality.

Although not mandatory, you would need to exhibit solid commitment to finish the course in order to produce solid data and hence solid results for the PhD study. All research activities would adhere to the ethical principles and guidelines required by the University of Nottingham.
You can expect to fulfil the following objectives during the study:
- o Measuring your ability to learn a new language by taking an aptitude test,
- o Learning a new language taught by a native speaker, and learning more about the Arabic culture - the Lebanese flavour,
- o Learning through new media of instruction, and learning to use new technologies (as applicable),
- o Meeting other students, while being part of a PhD research main study,

- o Making up your mind weather to learn the Arabic language or not,
- o Enhancing your understanding of, and ability to dialogue with Arabs,
- o Opening more career prospects for you by adding Arabic language training to your portfolio for potential employers,

For any enquiries or comments please feel free to contact me, the PhD researcher and course instructor Riad Saba at ttxrs6@nottingham.ac.uk or the PhD advisor Dr Mike Sharples mike.sharples@nottingham.ac.uk

Appendix 6.4   Participant Consent Form

Language Learning in Virtual Worlds
University of Nottingham - LSRI
October 3rd, 2008

Why do this study? The project goal is to explore the potential of Virtual Worlds Technology in the enhancement of language education, through a comparative study with Video Conferencing-based and a face-to-face Arabic language class.

How long will participation take? The Arabic language class would require around 8 80-minute sessions for each media type used. Each student would only need to participate in one of the media used to deliver the class.

Statement on Ethical Conduct during this Research: This research process shall abide by ethical principles and guidelines for conducting research at the School of Education in the University of Nottingham, which are in accordance with the British Psychological Society Code of Conduct, Ethical Principles & Guidelines (2001) pages 9-14, section on Ethical Principles for Conducting Research with Human Participants, and which are also in accordance with the Revised Ethical Guidelines for Educational Research (2004), pages 1-13, of the British Educational Research Association.

Student Declaration: As an informed participant of this research experiment, I understand that:
My participation is voluntary and I may cease to take part in this experiment at any time, without penalty.
I am aware of what my participation involves.
There are no risks involved in the participation of this study.
All my questions about the study have been satisfactorily answered.
I have read and understood the above, and give consent to participate:

Participant's Signature:_____   Date:_____

Researcher's Declaration: I have explained the above and answered all questions asked by the participant:

Researcher's Signature: <u>Riad Kaissar Saba</u>   Date: <u>October 3rd, 2008</u>

Appendix 6.5   Course Syllabus

Course Title: Spoken Lebanese Arabic Language
Course Objective:
To equip participants with basic Lebanese Arabic language skills that they could apply in Lebanese every-day conversations held in practical settings.
Course Delivery Methods:
- o   Face-to-Face classroom
- o   Video Conferencing
- o   Virtual World

Participants would be distributed to the media in such a way that insures all three groups taking the course have similar language abilities to allow for a fair comparison between media.

Rationale: The 3-media course delivery process would allow for a comparative analysis that would lead to general conclusions as to the effectiveness of the three media of language learning.
Course Timing: 8 to 9 sessions, from October 1st till November 26th, at a rate of an 80-minute session/week. Participants that will take the class in the Virtual World Second Life would need 1 or 2 extra training sessions.

Course Instructor and PhD Researcher: Riad Saba, MSEE, CISA
Email: ttxrs6@nottingham.ac.uk
Mobile Phone: 07870762190
Office Hours: By Appointment
Pre-requisites: Participants should have no Arabic Language Background
Course Textbook: No text book, only class handouts

Course Activities:
- o   Aptitude test
- o   Pre and Post Study attitude surveys
- o   Class lectures
- o   In-class and out-of-class practice
- o   Reflection sessions and focus group discussion
- o   Short Interviews
- o   Final assessment test

Certificate: All students who complete the course would receive a Certificate of Achievement. Since it is a short course, missing more than 1 lecture would be counter-productive as to the research study and the course learning outcomes.

Appendix 6.6   Lebanese Arabic language Lesson 1

Lesson Executive Summary

These lessons aim at delivering basic knowledge and skills in utilizing the Arabic language as spoken in Lebanon. Lebanese Arabic words and sentences shall be practiced leading to correct pronunciation. Basic practical grammatical concepts shall be covered, as well as basic Arabic language dialogue. Problematic Arabic letters which are not part of the English Alphabet would be practiced throughout the lesson.

Lebanese Arabic language Lesson 1

Activity 1:   Introducing oneself and getting introduced

Basic words table

Hello	Hello! – Marĥaba - Salam
Me	ʾana
Name	Isim
What	Šu

- My name is	ʾana ʾismi
- What is your name?(feminine)	šu ʾismik?
- What is your name? (Masculine)	šu ʾismak?
- Is your name Mary Smith? (Feminine)	ʾismik Mary Smith?
- Is your name John? (Masculine)	ʾismak John?

Practice Time

- Practice time with Instructor

- Practice time with other students

Meet 2 people that you do not know in the class, Introduce yourself, as they introduce themselves to you, using all the sentences structures above.

Activity 2:   Counting until 10 with relative ranks

Numbers 1 to 10 table, with relative ranks

Count until ten, (also means: keep cool)	'ed lel 'ašra :	Relative Rank	Tarteeb (also means order or neatness)
1	Waĥad	1st	Awwal
2	Tneyn	2nd	Téni
3	Tlété	3rd	Télét
4	Arb'aa	4th	rabé'a
56	Xamsé	56th	Xémis
6	Sétté	6th	Sédis
7	Sab'aa	7th	sébé'a
8	Tméné	8th	Témén
9	Tés'a	9th	tésé'a
10	'ašra	10th	'acher

Practice Time:

Practice time with the instructor

-        Count until 10

- You are the _____ child in your family
- This is the _____ time you learn Arabic
- You have _____ uncles
- You consider yourself the _____ of your class

Practice time with other students
- Ask another student to count till ten in Arabic.
- Speak the relative number ranks in Arabic from 1 to 10.

Activity 3:   Learning to use the days of the week
Days of the weeks and their alterations

Days of the week	iyāèm el jom'aa:
Sunday	Aĥad
Monday	Tanayn
Tuesday	Talété
Wednesday	orb'aa
Thursday	Xamīs
Friday	jom'aa
Saturday	Sabét
Jom'aa has two meanings: one week, and also Friday	
Today	'lyom
Tomorrow	Bukra
Yesterday	Mbereĥ
Day after tomorrow	ba'aed Bukra
Day before yesterday	'awwal Mbereĥ
Next Tuesday	talété el jéyé

Practice time

- Practice with the Instructor
-        When is your birthday ?   'emta 'id miledik (ak)?
In ………..   be ……
-        When is your next Arabic class? 'emta saf el 'Arabi el jéyé?
Answer:…………….
-        When do you go to the movies?   'emta betroĥ 'al cinama
Answer:…………….
- Practice with other students
Ask some related questions to your neighbour.

Concluding remarks

Appendix 6.7   **Participant Background Questionnaire Results**

21-4-2009

Section I: Participant General Information

a. Number of Participants   **(24)**

b. Age: *(Circle a range)*   20-29   30-39   40-49   Over 50

Results   **(19)**   **(2)**   **(1)**   **(2)**

c. Are you a student? *(Circle an answer)*:   Yes   No

Results   **(21)**   **(3)**

d. If Yes, at what level? *(Circle an answer)*:   BA/BSc   MA/MSc

PhD

Results   **(5)**   **(12)**

(3)

e. If No, what level did you achieve? *(Circle an answer)*: BA/BSc   MA/MSc   PhD

Results   **(1)**   **(1)**

f. What is your major/specialization?

Results

Liguistics(1)/language   studies(3)/critical   theory(1)/marketing(2)/international relations(6)/cultural   studies(1)/politics(2)/management(1)/security &terrorism(1)/law&finance(1)/sociology(1)/history(1)learning   sciences(1)/educational research(1)

g. How did you learn about the course? *(Circle an answer)*:

- o Flyer **(11)**
- o Presentation **(3)**
- o Email **(6)**
- o Website**(2)**   Which Website? **No Answer**
- o Friend **(3)**

Section II: Participant Language Background

a. Language Skills: State the languages that you know and circle the relevant skill
level for each language please:

Known Languages Language Skills	First Language:			Second Language:			Third Language:		
Understanding	W	F	Ex	W	F	Ex	W	F	Ex
Reading	W	F	Ex	W	F	Ex	W	F	Ex
Speaking	W	F	Ex	W	F	Ex	W	F	Ex
Writing	W	F	Ex	W	F	Ex	W	F	Ex

Legend   W: Weak   F: Fair   Ex: Excellent

Results filed separately

b. What is your English Language proficiency?

TOEFL Score **(253/300)** IBT **(97) - (106)**   IELTS Score **(8.0) - (7.5) - (7)** Other Test

c. How did you learn a second (or third) language? *(Tick all that apply as appropriate)*
- Learned second (or third) language at home **(7)**
- Learned second (or third) language at school   **(24)**
- Learned second (or third) language in College, required or elective? **(7)**
- Learned second (or third) language on my own **(8)**

d. What is your motivation to learn the Arabic language? *(Tick all that apply)*
- I enjoy language learning **(13)**
- To better understand the Arab culture and to better communicate with Arabs **(16)**
- I am required to learn a new language **(0)**
- Language learning could enhance my career prospects **(9)**
- Other reasons   **No Answer**

e. Your level of ability in Arabic Language as a second language
- None **(15)**
- A few words **(7)**
- Can write and/or speak simple sentences **(2)**
- Can speak and write Arabic well **(0)**

f. If you know some Arabic, how did you learn it?
Answer: Family(1)/friend(3)/live few months in Arab country(3)/ language classes(1)/

Appendix 6.8   Course Assessment

This assessment aims at measuring the learning outcomes of the five Arabic Lessons that were delivered in the past 6 weeks. The assessment measures learned vocabulary, pronunciation and sentence structure, as well as the ability to use these skills in practical situations. There are three parts in the assessment, sentence translation, pronunciation, and role play. The sentence translation is written, while the pronunciation and role play parts are verbal.

Part One: Sentence Translation

Translate the 10 following sentences into Lebanese Arabic:

- What is your name and where are you from?
- I am speaking Arabic now. I want to read and write Arabic.
- Their mother is in the kitchen.
- Is your birthday (speaking to a female) next week? Mine is.
- I want a good book from the library. Do you go there?
- The box is over the table. Inside it there is a small fridge.
- The teacher goes to Lebanon next Thursday. I want to go there next year. (Year in Arabic is sené)
- I am going to the University of Balamand. How much to Balamand (cost and time)?
- This is my third visit to Lebanon. Do you go to Britain?
- Is there another university in Lebanon?

Part Two: Pronunciation: Read the 16 following Arabic words out loud to the instructor:

ʿaalem	People
aĥad	Sunday
Xey	Brother
marĥaba	Hello
xebez	Bread
Jomʿaa	One week
Ṭabex	Cooking or cooked food
baʿaed	After
Taxet	Bed
Ĥrr	Hot taste
teʿaban	Tired
Maṭaar	Airport
Ṣofa	Sofa
Şebbat	Shoe
Reyaa(d)	Riad

Part Three: Role Play Activity

Choose two characters to impersonate, write down few relevant sentences for your reference, and prepare to engage in a role-play activity with the instructor. Roles possible include:

- Passport Control officer

- Taxi driver
- University student
- Tourist
- Hotel reception
- Room service
- Restaurant waiter
- A Lebanese friend on the same table at the restaurant
- A role of your choice

Appendix 6.9   Assessment Score Sheets

Assessment of Face-to-Face class – Wednesday 19-11-2008 at 2 PM

Name	Section I /40	Section II /30	Section III /30	Final Score /100
F-to-F St 1*	25	27	21	73
F-to-F St 2	32	23	27	82
F-to-F St 3	32	26	25	83
F-to-F St 4	26	29	28	83
F-to-F St 5	26	23	22	71

* A makeup for the final assessment was held on 26-11-2008 at 4:46 PM

Assessment of Videoconferencing class – Wednesday 26-11-2008 at 2 PM

Name	Section I /40	Section II /30	Section III /30	Final Score /100
VC St 1	29	28	25	82
VC St 3	28	30	24	82
VC St 3*	23	27	27	77

* A makeup for the final assessment was held on 26-11-2008 at 4:46 PM

Assessment of Virtual World class – Friday 21-11-2008 at 2 PM

Name	Section I /40	Section II /30	Section III /30	Final Score /100
VW St1	31	27	27	86
VW St2	28	27	26	80

Appendix 6.10   **Certificate of Completion**

Lebanese Arabic Language Course
October - November 2008

Course given by
PhD Researcher Riad Kaisar Saba
Learning Sciences Research Institute
University of Nottingham

Certificate of Completion

This is to certify that   attended seven sessions on Lebanese Arabic language at the University of Nottingham, Learning Sciences Research Institute and successfully achieved course objectives by acquiring basic spoken Lebanese Arabic language skills as used in practical settings like the Airport, at the Hotel, etc.

Professor Mike Sharples,	**Mr. Riad Saba**
Director, Learning Sciences Research Institute	**PhD Researcher**
Professor of Learning Sciences	**Course Instructor**
School of Education	**School of Education**
The University of Nottingham	**The University of Nottingham**

Appendix 6.11   Transcript of Incident

Study-1

Medium: Virtual World

Incident number:_____

Title of incident:_____

Lesson/date:_____

Time into lesson:_____

Incident type:

Breakdown:

- o   Technical failure - type_____
- o   VW usage error
- o   Activity related - Language misunderstanding
- o   Learning activity failure – do not understand the task.
- o   Other

Breakthrough:

- o   Understanding of material
- o   Successful completion of task
- o   Enjoying Learning
- o   Other

Incident was:

- o   Predictable
- o   Unpredicted

Remarks:_____

Appendix 6.12   Post-Study Attitude Survey – Face-to-Face Group Results

The statements in this section had to do with participant opinions about language learning and its importance. The question was: To what extent do you agree or disagree with each of the following statements about language Learning? (*Circle one attitude for each statement.*)

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
1. For me, learning another language is generally easy.	1	1	2	1	
2. Learning another language is best done with native speakers.	3	1	1		
3. I only like to learn a few basic words and phrases of another language without necessarily reaching an advanced stage.		1		3	1
4. I prefer to learn a new language on my own, without the help of a teacher.				3	2
5. Learning another language would help me understand its culture better.	2	3			
6. Learning Arabic has been more challenging than learning other languages.	3	1	1		
7. Learning Arabic requires dedication and time that I was able to allocate for this class.	2	2	1		
8. I enjoyed learning the Arabic language.	3	2			
9. I do not feel comfortable using the newly acquired Arabic language skills.			2	1	1
10. The Arabic language class material was appropriate in content and structure		4	1		
11. The Arabic language class material was appropriate in content and delivery rate.		4		1	
12. The Arabic language 'classroom' was suitable for class delivery.	3	2			
13. The instructor was suitable for the course.	1	3	1		
14. I would like to pursue learning the Arabic language further.	3	1	1		

Appendix 6.13   **Post-Study Attitude Survey – VC Group Results – Section1**

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
1. For me, learning another language is generally easy.	1		1	2	
2. Learning another language is best done with native speakers.	1	3			
3. I only like to learn a few basic words and phrases of another language without necessarily reaching an advanced stage.		2		2	
4. I prefer to learn a new language on my own, without the help of a teacher.				3	1
5. Learning another language would help me understand its culture better.	1	2	1		
6. Learning Arabic has been more challenging than learning other languages.	1	2	1		
7. Learning Arabic requires dedication and time that I was able to allocate for this class.		2	1	1	
8. I enjoyed learning the Arabic language.	2	2			
9. I do not feel comfortable using the newly acquired Arabic language skills.			1	2	1
10. The Arabic language class material was appropriate in form and structure		4			
11. The Arabic language class material was appropriate in content and delivery rate.		3		1	
12. The Arabic language 'classroom' was suitable for class delivery.		2	1	1	
13. The instructor was suitable for the course.	3	1			
14. I would like to pursue learning the Arabic language further.	2	1	1		

Appendix 6.14   Post-Study Attitude Survey – VC Group Results – Section2

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
1. A face-to-face classroom is more effective than a remote classroom using Videoconferencing			3		
2. Videoconferencing technology limits direct interactions with the teacher.				3	
3. I prefer to take language classes through a face-to-face classroom. If you agree, could you please explain?		1	1	1	
4. I like to explore a new medium of learning regardless of learning outcomes.	1	1		1	
5. I am comfortable learning with educational technology like Videoconferencing		3			
6. Videoconferencing technology allows more flexibility for learning anytime, anywhere.		2	1		
7. What is the most effective technology tool that you have experienced through your Education?	Comment: I like when videos are incorporated in the classroom as an aid (not the teaching means but to aid teaching especially a particular thing). Comment: CDs and headphones are helpful to practise listening and pronunciation.				

Appendix 6.15   Post-Study Attitude Survey – VW Group Results - Section1

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
1. For me, learning another language is generally easy.		2			
2. Learning another language is best done with native speakers.	1		1		
3. I only like to learn a few basic words and phrases of another language without necessarily reaching an advanced stage.		1		1	
4. I prefer to learn a new language on my own, without the help of a teacher.		1			1
5. Learning another language would help me understand its culture better.		1	1		
6. Learning Arabic has been more challenging than learning other languages.	1		1		
7. Learning Arabic requires dedication and time that I was able to allocate for this class.		1	1		
8. I enjoyed learning the Arabic language.	1	1			
9. I do not feel comfortable using the newly acquired Arabic language skills.		1		1	
10. The Arabic language class material was appropriate in form and structure		1	1		
11. The Arabic language class material was appropriate in content and delivery rate.		2			
12. The Arabic language 'classroom' was suitable for class delivery.	1	1			
13. The instructor was suitable for the course.	1		1		
14. I would like to pursue learning the Arabic language further.	1	1			

Appendix 6.16   **Post-Study Attitude Survey – VW Group Results – Section2**

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
1. A face-to-face classroom is more effective than a remote classroom using Virtual Worlds.		1	1		
2. Virtual Worlds technology limits direct interactions with the teacher.		1	1		
3. I prefer to take language classes through a face-to-face classroom. If you agree, could you please explain?		1		1	
4. I like to explore a new medium of learning regardless of learning outcomes.		2			
5. I am comfortable learning with educational technology like Virtual Worlds.		1		1	
6. Virtual Worlds technology allows more flexibility for learning anytime, anywhere.		2			
7. Virtual Worlds-based classes allow reserved learners to express themselves more freely and hence better engage in the learning process.		1	1		
8. What is the most effective technology tool that you have experienced through your language learning?	The SL practice boards were very useful. I also like charts that connect all we learn, both as a visual aid and as a tool to show how learning interconnects – charts on all tenses in a language for example.				

Appendix 7.1   Invitation Pamphlet

The Learning Sciences Research Institute

Has the pleasure to invite you to participate in a

Lebanese Arabic Language Sampler Lessons

As part of a PhD research project Titled:
Language Learning in Virtual Worlds

When?   Initial meeting on Tuesday September 29th at 12 noon, then 2-hour sessions on Wednesday September 30th, and Thursday October 1st, 2009

Where?   Jubilee Campus, Exchange Building, 1st floor, B3

Allowance?   We Pay you 30 pounds inconvenience allowance

Background? You should have no background in Arabic but be able to use the computer

Why?
  o Learn a new language taught by a native speaker – and get paid!
  o Learn more about the Arabic culture - the Lebanese flavour
  o Get exposed to research methods in Technology Enhanced Learning

For any enquiries please feel free to contact the PhD researcher and instructor Riad Saba at ttxrs6@nottingham.ac.uk

Phone inquiries are also welcome at the mobile phone 07503124056

Appendix 7.2   Email Sent to Potential Participants

"Dear friends:

My name is Riad Saba, a PhD researcher at the Learning Sciences Research Institute (LSRI) at the University of Nottingham.

You are getting this email because you have participated before in an experiment at the LSRI.

There is a 50/50 chance that I will run a short experiment (3-5 hours) towards the end of September that involves learning the Arabic language through the online virtual world Second Life, which would require that you know how to use a computer. I would need about 5 to 10 participants in the experiment.

If you are interested in participating, please let me know by responding to this email with the word 'Interested', and feel free to ask any questions.

Many thanks and I wish you all the best

Riad Saba
PhD researcher
Learning Sciences Research Institute.
University of Nottingham"

Appendix 7.3   Information Sheet for Participants

Dear Participant:

In the course of conducting a PhD research study for investigating the effectiveness of Virtual Worlds technology in Language Learning, it is with delight that I invite you to participate in an Arabic language 'taster' lessons due to run at the University of Nottingham (UON) in September and early October, 2009.

The Spoken Lebanese Arabic language lessons would be delivered by myself, LSRI PhD research student Riad Saba, an Arabic language native speaker. I plan to deliver the Language lessons through 2 different media of instruction, a normal face-to-face classroom, and a Virtual World called Second Life. The initial meeting is scheduled for Tuesday September 29th, 2009. The Arabic learning activities shall be conducted during the same week, between September 30th and October 1st, at a rate of one two 2-hour session per day. The final schedule would be confirmed upon consultation with you.

At the end of each lesson, an interview and a learning assessment would be conducted to reflect on participant attitudes towards the media of instruction used and to measure learning outcomes. At the end of the 2 lessons, you would be asked to fill a post-assessment attitude survey. The total number of hours that you would need to commit for this experiment is around 6 hours.

Although not mandatory, you would need to have solid commitment to finish the experiment in order to produce solid data and hence solid results for the PhD study. You are not obliged to complete the classes, but that would cause problems to the research experiment. Hence the inconvenience allowance of 30 pounds would be paid at the end of the experiment, subject to the participant completing all experiment activities. A participant who misses any related activity waives his/her right to receive the convenience allowance agreed upon.

All research activities would adhere to the ethical principles and guidelines required by the University of Nottingham. The data generated would be analyzed qualitatively and anonymously, protecting your identity, and preserving any personal information that was collected during research activities in strict confidentiality. Before lessons start, you would be asked to fill a personal-schedule sheet and sign a consent form required by the University for conducting research activities.

For any enquiries or comments please feel free to contact me, the PhD researcher and course instructor Riad Saba at ttxrs6@nottingham.ac.uk.   Phone number 07503124056

Appendix 7.4   Participation Consent Form

Language Learning in Virtual Worlds
University of Nottingham - LSRI
September 29th, 2009

Why do this study? The project goal is to explore the potential of Virtual Worlds Technology (VW) in the enhancement of language education, through a comparative study between a VW class and a face-to-face Arabic language class.

How long will participation take? The Arabic language class would require around 4 hours for each media type used.

Statement on Ethical Conduct during this Research: This research process shall abide by ethical principles and guidelines for conducting research at the School of Education in the University of Nottingham, which are in accordance with the British Psychological Society Code of Conduct, Ethical Principles & Guidelines (2001) pages 9-14, section on Ethical Principles for Conducting Research with Human Participants, and which are also in accordance with the Revised Ethical Guidelines for Educational Research (2004), pages 1-13, of the British Educational Research Association.

Drop-out Policy: Although the student is not obliged to complete the classes, this would impose great problems to the research experiment and hence the inconvenience allowance would be paid in one shot at the end of the course, and participants who miss classes would thus not be receive the allowance agreed upon at the start of the course.

Student Declaration: As an informed participant of this research experiment, I understand that:
- My participation is voluntary and I may cease to take part in this experiment at any time, without penalty.
- I am aware of what my participation involves.
- There are no risks involved in the participation of this study.
- All my questions about the study have been satisfactorily answered.

I have read and understood the above, and give consent to participate:
Participant's Signature:_____   Date:_____

Researcher's Declaration: I have explained the above and answered all questions asked by the participant:

Researcher's Signature: <u>Riad Kaissar Saba</u>   <u>Date: September 29th, 2009</u>

Appendix 7.5   Personal-Data Questionnaire

Section I: Participant Personal Information

- What is your Name?   First Name_____   Family Name _____
- What is your gender? *(Circle an answer)*   Male   Female
- What is your age range? *(Circle an answer)*   20-29   30-39   40-49   Over 50
- What is your nationality? _____
- Are you a student? *(Circle an answer)*:   Yes   No
- If Yes, at what level? *(Circle an answer)*:   BA/BSc   MA/MSc   PhD
- If No, what level did you achieve? (Circle an answer):BA/BSc   MA/MSc   PhD
- What is your major/specialization? _____
- What is your current occupation or job? _____

Section II: Participant Language Skills

State the languages that you know and circle the relevant skill level for each language:

Known Languages / Language Skills	First Language:			Second Language:			Third Language:			Fourth Language:		
Understanding	W	F	Ex	W	F	Ex	W	F	Ex	W	F	Ex
Speaking	W	F	Ex	W	F	Ex	W	F	Ex	W	F	Ex
Reading	W	F	Ex	W	F	Ex	W	F	Ex	W	F	Ex
Writing	W	F	Ex	W	F	Ex	W	F	Ex	W	F	Ex

Legend   W: Weak   F: Fair   Ex: Excellent

- Any other languages besides the 4 above (sign language, etc)?_____
- Have you taken any English Language proficiency tests?_____
- If yes, what scores did you achieve?

    TOEFL _____   IBT_____   IELTS Score_____ Other Tests_____

How did you learn a second (or third) language? *(Tick all that apply as appropriate)*

- Learned second (or third) language at home
- Learned second (or third) language at school/College
- Learned second (or third) language on my own

What is your motivation to learn to new language? *(Tick all that apply)*

- I enjoy language learning
- I am required to learn a new language   Why? _____
- Language learning enhances my career
- Other reasons   _____

How easy it for you when it comes to learning new languages

- Easy
- Somewhat easy but takes some effort
- Difficult

o   Very Difficult

Is it important for you to learn the Arabic language? _____ *If So, why (Tick all that apply)*
- o   To better understand the Arab culture and to better communicate with Arabs
- o   To deal with contemporary Arab issues (like Islamic extremism) more effectively
- o   To enhance future career or business prospects
- o   Other reason(s): _____

If you already know some Arabic, what is your level of ability in Arabic Language as a second language
- o   None
- o   A few words
- o   Can write and/or speak simple sentences
- o   Can speak, read, and write Arabic well

How do you find yourself when it comes to using computers
- o   Professional user (Programmer-developer, etc)
- o   Advanced user (specialized applications like SPSS, etc)
- o   Average user (email-Internet-work processing--)
- o   Novice user (little or no use of the computer)

Have you used sims or online virtual worlds or animated computer games before where you control an avatar to move around and achieve specific tasks?
- o   Never
- o   Few times   Example_____
- o   Many times   Example_____
- o   Always   Example_____

If you know some Arabic, how did you learn it?
- o   Family/friend
- o   live few months in Arab country
- o   language classes
- o   Other

Any personal statements related to the above questions are most welcome _____

Appendix 7.6   Study-2 Implementation Time Table

September 22nd till October 1st, 2009

Date	Activity	Remarks
Tuesday September 22nd	Email to participants containing personal-data questionnaire and time sheet of availability to be filled out and mailed back in 2 days	The information were used to select participants for the Study
Tuesday September 29th, 2009	Initiation meeting: Welcome Overview of research and classes Consent form Pre-study attitude survey Arrangements to access Second Life Time scheduling	This was a two-hour meeting for all participants selected to join the study.
Wednesday September 30th, 2009	1st Arabic language session Assessment	10-min introduction 80-min class activities 20-min assessment
Thursday October 1st, 2009	2nd Arabic language session Assessment Post Attitude survey Interview session Closing remarks	80-min class activities, 10-min interview 20-min assessment 10-min post-study attitude survey

Appendix 7.7   Lesson 1 Class Handouts

Lebanese-Arabic language Lesson 1

Lesson Executive Summary
This lesson aims at delivering basic knowledge and skills in utilizing the Arabic language as spoken in Lebanon. Lebanese Arabic words and sentences shall be practiced leading to correct pronunciation and use. Problematic Arabic letters which are not part of the English Alphabet will be practiced throughout the lesson. A role-play activity will be practiced at the end of the lesson centering around the arrival into the airport and taking a taxi to the Hotel in Tripoli.

Activity 1   Introducing oneself and greeting others   (15 minutes)
Greetings

Hello – Piece	Marĥaba - Salam
Good morning	Şabaaĥ elxer
Good evening	Masa elxer
How are you? (Feminine)	Kifik?
How are you? (Masculine)	Kifak?
Good, thank God (feminine)	Mniĥa, Niškur 'Alla
Good, thank God (masculine)	Mniĥ, Niškur 'Alla

Introductions

I - I am – Me	'Ana
Name	Isim
What is your name?(feminine)	Šu 'ismik?
What is your name? (Masculine)	Šu 'ismak?
My name is	'Ana 'ismi

Where are you from?

Where are you from? (feminine)	Inti Minnan?
Where are you from? (masculine)	Inta Minnan?
I am from Britain (both fem and mas)	'Ana min Britania

Practice Time
- Practice with Instructor
- Practice with participants nearby:
Meet 2 people that you do not know in the class, Introduce yourself, as they introduce themselves to you, and hold a short Arabic conversation based on the above tables.

Activity 2   Pronunciation and Vocabulary   (15 minutes)
Words with the ĥ sound:

waḥad	one
aḥad	Sunday
mbereḥ	yesterday
Marḥaba	hello
mniḥ(a)	I am well
behḥki	I talk – I speak

More words with the ḥ sound:

ḥelo	sweets - beautiful
ḥrr	hot taste
ḥabibi	sweetheart
Ḥayat	Life
baḥer	Sea
broḥ	I go

Words with the X (Kh) sound

xamis	Thursday
xamse	Five
Xy	brother
Oxet	sister
Taxet	Bed
Mxaddeh	pillow
Xait	thread
xebez	bread

Practice Time

On your own, see how close you could get to the actual spelling.

Try to remember the meanings of words, and check in pairs of participants your score over 20 words, without looking at the tables above.

Your Score (out of 20 words):_____

Say good morning in Arabic

Have the instructor check your pronunciation and vocabulary retention.

Activity 3   Counting till 10 with relative ranks (15 minutes)

Numbers 1 to 10 table, with relative ranks

Count until ten, (also means: keep cool)	'ed lel 'ašra :	Relative Rank	Tarteeb (also means order or neatness)
1	waĥad	1st	Awwal
2	tneyn	2nd	Téni
3	Tlété	3rd	Télét
4	arb'aa	4th	rabé'a
5	xamsé	5th	Xémis
6	sétté	6th	Sédis
7	sab'aa	7th	sébé'a
8	tméné	8th	Témén
9	tés'a	9th	tésé'a
10	'ašra	10th	'acher

Practice Time:

Practice time with the instructor

- Count until 10

- You are the _____ child in your family

- This is the _____ time you learn Arabic

- You have _____ brothers and sisters

- You consider yourself _____ in your class   (only applies if you consider yourself in the top 10 ☺)

Practice time with other students

- Ask another student to count till ten in Arabic.

- Speak the relative number ranks in Arabic from 1 to 10.

Activity 4   Using Connectors and Useful Words (15 minutes)

From -	Min - Example: From Lebanon - Min Lebnan
To -	'a - Example: To the Hotel - 'al otel
With	Ma'a Example: Batata Ma'a ketshup
Yes	A
No	La
I don't want water	Ma baddi My
I want beer	Baddi bira
How?	Kif?
How much to the Hotel? (time - cost)	Eddeš 'al otel?
Where?	Wen?
When?	Emta?

Practice time:

Can you say something in Arabic to the air-hostess on the plane?

Can you say something to the instructor?

Activity 5   At the Airport (matār) (15 minutes)

Reference Table

Where are you going?	La wen rayeĥ?
I'm coming from London	Ana jéyé men lundun
He's going to Beirut	Houé rayeĥ 'ala Bayrot
This is the passport	Heida 'el basbore
Luggage	Šanta (singular) Šanat (plural)
Visit	Zyara
English	Inglisi
Slow down	'A mahlak

Practice Time: In groups of 2, translate the following sentences into Lebanese Arabic:

I am (your nationality). I am coming from Nottingham.	
Do you speak English? I can speak Arabic.	
I am coming for a visit to Lebanon.	
I am going to Tripoli. How much to Tripoli?	
Where is the luggage?	
Slow down please.	

Have the instructor check your translated sentences

Activity 6   Role Play – At the Airport (15 minutes)

Choose a character to impersonate, prepare few relevant sentences, and engage in a role play activity with the instructor. Roles suggested:

- o Passport Control officer
- o Taxi driver
- o Air hostess
- o Tourist

Sentence 1.	
Sentence 2	
Sentence 3	
Sentence 4	

Concluding remarks

Practice makes perfect. Try practice the new acquired Arabic grammar and vocabulary with Arabic friends or when you visit an Arab country. You are welcome in Lebanon anytime. Write me before you come!

Review for the assessment

Appendix 7.8   **Pre-Study Attitude Survey**

Section I: Attitudes Towards Language Learning
The statements in this section have to do with participant opinions about language learning and its importance. To what extent do you agree or disagree with each of the following statements about language Learning? (*Circle one attitude for each statement.*)

<u>Legend</u>
Strongly Agree --------- SA
Agree ---------------------- A
Not sure ------------------ N
Disagree ------------------ D
Strongly Disagree ------ SD

1. For me, learning another language is easy.

SA   A   N   D   SD

Comments:

2. A second language is part of an educated person's profile.

SA   A   N   D   SD

Comments:

3. Learning another language is best done with native speakers while I am visiting their country.

SA   A   N   D   SD

Comments:

4. Learning another language would help me understand its culture better.

SA   A   N   D   SD

Comments:

5. If I travel to another country I find it important to learn its language because this would allow me to relate to its native speakers in a better way.

SA   A   N   D   SD

Comments:

6. Business today is global, but English is enough to do business globally.

SA   A   N   D   SD

Comments:

7. I only like to learn a few basic words and phrases of another language without necessarily reaching an advanced stage.

SA   A   N   D   SD

Comments:

8. Overall I think it is important to learn another language.

SA   A   N   D   SD

Comments:

9. I prefer to learn a new language on my own, without the help of a teacher.

SA   A   N   D   SD

Comments:

Section II: Attitudes Towards Educational Technology and Mediums of Learning.
To what extent do you agree or disagree with each of the following statements about Educational Technology? (*Circle one attitude for each statement.*)

<u>Legend</u>
Strongly Agree --------- SA
Agree ----------------------A
Not sure ------------------N
Disagree ------------------D
Strongly Disagree ------SD

1. I have taken classes through educational technology before.

SA   A   N   D   SD

If you did take such a class, through which media?

Comments :

2. Technology allows reserved learners to express themselves more freely and hence better engage in the learning process.

SA   A   N   D   SD

Comments:

3. A face-to-face classroom is more effective than a remote classroom using technology.

SA   A   N   D   SD

Comments:

4. Technology limits direct interactions with the teacher

SA   A   N   D   SD

Comments:

5. I prefer to take language classes through a face-to-face classroom.

SA   A   N   D   SD

If so, why ? _____

Comments:

6. I like to explore a new medium of learning regardless of learning outcomes

SA   A   N   D   SD

Comments:

7. I am comfortable working with educational technology like e-learning.

SA   A   N   D   SD

Comments:

8. Technology allows more flexibility for learning anytime, anywhere

SA   A   N   D   SD

If so, could you give an example or two? _____

9. Some computer video games could be educational.

SA   A   N   D   SD

Comments:

11. What is the most effective technology tool that you experienced while learning?
(Circle one that applies)
   e.   Language tapes/CDs
   f.   E-dictionary or Internet-based lessons
   g.   Video conferencing
   h.   Watching Movies or Educational TV

Appendix 7.9   Post-Study Attitude Survey - Study-2

Section I: Attitudes Towards Language Learning
The statements in this section have to do with participant opinions about language learning and its importance. The question is: To what extent do you agree or disagree with each of the following statements about language Learning? (*Circle one attitude for each statement.*)

<u>Legend</u>
Strongly Agree --------- SA
Agree --------------------- A
Not sure ------------------ N
Disagree ------------------ D
Strongly Disagree ------ SD

1. For me, learning another language is generally easy.

SA   A   N   D   SD

Comments:

2. Learning another language is best done with native speakers.

SA   A   N   D   SD

Comments

3. I consider myself a visual learner where pictures help me a lot to learn

SA   A   N   D   SD

Comments:

4. I prefer to learn a new language on my own, without the help of a teacher.

SA   A   N   D   SD

Comments:

5. Learning another language would help me understand its culture better.

SA   A   N   D   SD

Comments:

6. Learning Arabic has been more challenging than learning other languages.

SA   A   N   D   SD

Comments:

7. I did not enjoy taking Arabic lessons.

SA   A   N   D   SD

Comments:

8. I feel comfortable using the newly acquired Arabic language skills.

SA   A   N   D   SD

Comments:

9. The Arabic language class material was appropriate in content and structure

SA   A   N   D   SD

Comments:

10. The Arabic language class material was appropriate in delivery rate.

SA   A   N   D   SD

Comments:

11. The Arabic language 'classrooms' were suitable for class delivery.

SA   A   N   D   SD

Comments:

12. I worry a lot about making mistakes when learning with a group

SA   A   N   D   SD

Comments:

13. I would like to pursue learning the Arabic language further.

SA   A   N   D   SD

Comments:

14. In a language class I prefer to hide my identity (like through an avatar)

SA   A   N   D   SD

Comments:

15.   I find it hard to make conversation even with people who speak my own language.

SA   A   N   D   SD

Comments:

16. What is the most effective personal technique that you have experienced through your language learning?

Section II: Attitudes Toward the Mediums of Learning.
To what extent do you agree or disagree with each of the following statements about the mediums used for delivering the lessons? (*Circle one attitude for each statement please.*)

Legend
Strongly Agree --------- SA
Agree ---------------------A
Not sure ------------------N
Disagree -----------------D
Strongly Disagree ------SD

1. A face-to-face classroom is more effective than a remote classroom using Virtual Worlds.

SA   A   N   D   SD

Comments:

2. Virtual Worlds technology limits direct interactions with the teacher.

SA   A   N   D   SD

Comments:

3. I prefer to take language classes through a face-to-face classroom.

SA   A   N   D   SD

If you agree, could you please explain?

4. I like to explore a new medium of learning regardless of learning outcomes.

SA   A   N   D   SD

Comments:

5. I am comfortable learning with educational technology like Virtual Worlds.

SA   A   N   D   SD

Comments:

6. Virtual Worlds technology allows more flexibility for learning anytime, anywhere.

SA   A   N   D   SD

Comments:

7. Virtual Worlds-based classes allow reserved learners to express themselves more freely and hence better engage in the learning process.

SA   A   N   D   SD

Comments:

8. Having an instructor physically is very similar to having the instructor virtually

SA   A   N   D   SD

Comments:

9. Pronunciation is best done in a face-to-face classroom

SA   A   N   D   SD

Comments:

10. Vocabulary learning is better suited for the Virtual World medium

SA   A   N   D   SD

Comments:

11.   Class   interactions   were   easier   in   the   Virtual   Worlds   lesson

SA   A   N   D   SD

Comments:

12. If given the choice I would prefer face-to-face medium over virtual world medium

SA   A   N   D   SD

Comments: Why or why not?

13. Group practice was easier in the face-to-face medium

SA   A   N   D   SD

Comments:

14.   Practice of learned material was easier in the face-to-face medium

SA   A   N   D   SD

Comments:

15. What is the most effective technology tool that you have experienced through your language learning?

Thank you very much for completing this survey. Your work is much appreciated.

Appendix 7.10 Post-Study Attitude Survey Results Table - Group A

Section I: Attitudes towards Language Learning

The statements in this section have to do with participant opinions about language learning and its importance. The question is: To what extent do you agree or disagree with each of the following statements about language Learning? (*Circle one attitude for each statement.*)

Statement/ Response	Strongly Agree	Agree	Not sure	Dis- agree	Strongly Disagree	Comments
1. For me, learning another language is generally easy.		4	4		2	Some languages are more difficult than others – confused Arabic with other languages – I enjoyed learning Arabic
2. Learning another language is best done with native speakers.	3	5	1	1		Non-natives are sensitive to learning difficulties because they have walked the same way – Better grammar with non natives - Right pronunciation with natives- you cannot escape learning the language with natives
3. I consider myself a visual learner where pictures help me a lot to learn	3	4	2	1		
4. I prefer to learn a new language on my own, without the help of a teacher.			1	6	3	Teachers provide more support and interaction
5. Learning another language would help me understand its culture better.	3	6	1			
6. Learning Arabic has been more challenging than learning other languages.	3	4	2	1		- Every language has its characteristics – difficult since no prior knowledge of culture – other languages are easier
7. I did not enjoy taking Arabic lessons.		1	2	3	4	I did not like this method – not able to catch up with lectures so felt stressed
8. I feel comfortable using the newly acquired Arabic language skills.		3	1	4	2	Did not learn enough – needed more time
9. The Arabic language class material was appropriate in content and structure		5	3	2		Too fast- passed – depends on predetermined goals – some aspects need improvement – monotonous/no pictures

Statement						Comments
10. The Arabic language class material was appropriate in delivery rate.		5	1	3	1	Too fast – more time needed
11. The Arabic language 'classrooms' were suitable for class delivery.	4	5	1			Setup island for pair – small group
12. I worry a lot about making mistakes when learning with a group	2		4	4		Mistakes are part of learning
13. I would like to pursue learning the Arabic language further.	2	7		1		Any language is great to learn
14. In a language class I prefer to hide my identity (like through an avatar)	1	1	2	5	1	It was hard to grasp technology and new language – prefer interaction
15. I find it hard to make conversation even with people who speak my own language.			3	3	4	
16. What is the most effective personal technique that you have experienced through your language learning?	Practice and repetition – visiting the country – teacher-student interaction – writing pronunciation in simple form – visuals					

Section II: Attitudes Toward the Media of Learning.

To what extent do you agree or disagree with each of the following statements about the media used for delivering the lessons? (*Circle one attitude for each statement please.*)

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree	Comments
1. A face-to-face classroom is more effective than a remote classroom using Virtual Worlds.	3	3	4			VW may suit some students and may help in some skills – VW need experienced users – both media are similar
2. Virtual Worlds technology limits direct interactions with the teacher.	2	3	2	2	1	We still can talk with teacher – limits interaction only physically
3. I prefer to take language classes through a face-to-face classroom. If you agree, could you please explain?	3	4	2	1		- easy interaction – I rely on lip reading – more interaction – depends on users – technology takes time to setup
4. I like to explore a new medium of learning regardless of learning outcomes.	4	5		1		- the outcome is more important – research is top priority
5. I am comfortable learning with educational technology like Virtual Worlds.	3	3	3	1		
6. Virtual Worlds technology allows more flexibility for learning anytime, anywhere.	3	6		1		
7. Virtual Worlds-based classes allow reserved learners to express themselves more freely and hence better engage in the learning process.	2	6	2			
8. Having an instructor physically is very similar to having the instructor virtually	1	3	1	3	2	Seeing the mouth and sounds are different – no difference – direct interactions are necessary

9. Pronunciation is best done in a face-to-face classroom	4		4		2	Face-to-face student looks at mouth – In VW the best thing is to repeat pronunciation – microphone can take care of this
10. Vocabulary learning is better suited for the Virtual World medium	1	3	3	3		- better to hear pronunciation many times before seeing words – If new words come up, the instructor can only pronounce them and not write them – no difference between media
11. Class interactions were easier in the Virtual Worlds lesson	1	1	5	1	2	When students talk at the same time we cannot hear anything – same interactions in both media
12. If given the choice I would prefer face-to-face medium over virtual world medium Why yes or why no?	3	4	2	1		- Yes since more personal interaction – less distractions – like traditional learning. Same for both – no difference
13. Group practice was easier in the face-to-face medium	3	2	3	2		
14. Practice of learned material was easier in the face-to-face medium	2	4	4			Both
15. What is the most effective technology tool that you have experienced through your language learning?	Printouts – hearing others was distracting in VW Could not hear and read properly in the VW Instructor was hard to find in the VW Film – Online material – Second Life – face-to-face – CDs – own pace – repetitive pronunciation					

Appendix 7.11   Post-Study Attitude Survey Results Table - Group B

Section I: Attitudes Towards Language Learning
The statements in this section have to do with participant opinions about language learning and its importance. The question is: To what extent do you agree or disagree with each of the following statements about language Learning? (*Circle one attitude for each statement.*)

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree	Comments
1. For me, learning another language is generally easy.		5	1	1	1	- It takes time - I have bad memory
2. Learning another language is best done with native speakers.	6	2		1		- natives are professionals in language – non-natives can relate words to the language of the student
3. I consider myself a visual learner where pictures help me a lot to learn	2	4	2	1		I am auditory
4. I prefer to learn a new language on my own, without the help of a teacher.				4	5	- I cannot learn without teacher – I encounter problems without teacher
5. Learning another language would help me understand its culture better.	5	4				It helps acquaint with new country
6. Learning Arabic has been more challenging than learning other languages.	7			2		Arabic is totally different from languages I know – Arabic has challenging vocal sounds – different from other languages – different sounds
7. I did not enjoy taking Arabic lessons.				6	3	- It was fun and challenging – I enjoyed SL more than F-to-F
8. I feel comfortable using the newly acquired Arabic language skills.		5	3		1	- I need further practice - I need further time

Statement						Comments
9. The Arabic language class material was appropriate in content and structure	2	5	1	1		- not organized – right pace and right proper sentences – the role play was different
10. The Arabic language class material was appropriate in delivery rate.	1	7		1		Too fast
11. The Arabic language 'classrooms' were suitable for class delivery.	2	7				f-to-f classes were more suitable since they gave direct interaction with teacher
12. I worry a lot about making mistakes when learning with a group	2	1	3	3		- I feel comfortable – depending on how well you know the group – mistakes help to learn better – group encourages learning
13. I would like to pursue learning the Arabic language further.	1	2	4	2		- I learn if I travel to Arabic countries – One day not now – I learn if I need it
14. In a language class I prefer to hide my identity (like through an avatar)	1	1	1	6		Easier to interact in SL, I felt less self conscious
15. I find it hard to make conversation even with people who speak my own language.				2	7	
16. What is the most effective personal technique that you have experienced through your language learning?	- Class revision GCSE books – Pneumonics work well with me – f-to-f classes – media – flash cards – talk with natives					

Section II: Attitudes toward the Media of Learning.

To what extent do you agree or disagree with each of the following statements about the media used for delivering the lessons? (*Circle one attitude for each statement please.*)

Statement/Response	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree	Comments
1. A face-to-face classroom is more effective than a remote classroom using Virtual Worlds.	2	3	2	2		Interesting but short
2. Virtual Worlds technology limits direct interactions with the teacher.	3	2	2	1	1	No because I can shout out – VW has interaction but f-to-f solves the problem of sound
3. I prefer to take language classes through a face-to-face classroom. If you agree, could you please explain?	4	3	1	1		- easier interaction - disagree because SL and VW was interesting
4. I like to explore a new medium of learning regardless of learning outcomes.	3	5		1		Variety engages students more
5. I am comfortable learning with educational technology like Virtual Worlds.	2	4	2		1	
6. Virtual Worlds technology allows more flexibility for learning anytime, anywhere.	2	7				Yes, no need to travel to a language centre
7. Virtual Worlds-based classes allow reserved learners to express themselves more freely and hence better engage in the learning process.	2	1	6			Their voices will still be heard in SL so they will still be reserved
8. Having an instructor physically is very similar to having the instructor virtually		3	1	4	1	Like to see teacher's face
9. Pronunciation is best done in a face-to-face classroom	6	2	1			- I listen clearly in f-to-f - It helps to see teacher's mouth

10. Vocabulary learning is better suited for the Virtual World medium		2	4	2	1	Distorted listening in the VW
11. Class interactions were easier in the Virtual Worlds lesson		1	2	5	1	Face-to-face is better
12. If given the choice I would prefer face-to-face medium over virtual world medium Why yes or why no?	3	2	4			Face-to-face allows better interaction and is easier
13. Group practice was easier in the face-to-face medium	3	5	1			Yes due to sound problems, and time needed to adapt to VW
14. Practice of learned material was easier in the face-to-face medium	1	6	2			
15. What is the most effective technology tool that you have experienced through your language learning?	- Virtual learning saves time and money – Class revision in GCSE books – video clips – videoconference- traditional classes – SL anywhere anytime – media and talking to natives – media – Used Rose and Stone but was not useful					

Appendix 7.12   Lesson 1 Assessment

Lebanese-Arabic language Lesson-1 Assessment
30 September, 2009
Participant Name:_____

This assessment aims at measuring the learning outcomes of the Arabic language learning activities that took place today. The assessment measures learned vocabulary, pronunciation and sentence structure, as well as the ability to use these skills in practical situations. There are three parts in the assessment, vocabulary retention, sentence translation, and pronunciation. The vocabulary and sentence translation is written, while the pronunciation is verbal.

Part One: Vocabulary

Write the correct word in Arabic next to its English counterpart: [5 points each]

English	Arabic
Hello	
Britain	
Name	
Luggage	
Passport	
Visit	
Seven	

Part Two: Sentence Translation

Translate the seven following sentences into Lebanese Arabic: [5 points each]

- o   What is your name?
- o   Where are you from?
- o   First visit
- o   I want water
- o   To the Hotel
- o   From Britain
- o   I go with my brother

Part Three: Pronunciation

Read the 10 following Arabic words out loud to the instructor: [3 points each]

Aĥad	Sunday
Xey	Brother
Marĥaba	Hello
Xebez	Bread
Ĥrr	Hot taste
Oxet	Sister
Taxet	Bed
mniĥ(a)	I am well
Behĥki	I talk – I speak
Broĥ	I go

Appendix 7.13   Interview Questions

This set of open-ended questions would be best answered by participants who engaged in both Virtual World and Face-to-Face classroom activities.

Interview open-ended questions:

- o   How was the VW class similar to the face-to-face class?
- o   How did the VW differ from the face-to-face class?
- o   Which medium allowed you better understanding of lectures? Explain
- o   Which medium allowed better communication with the instructor?
- o   Which medium allowed better communication with other participants?
- o   Which medium allowed you more command of vocabulary skills?
- o   Which medium allowed you better to work at your own pace?
- o   What are some of the problems in the Virtual World class?
- o   What are some of the successes in the Virtual World class?
- o   In general, what do you recommend to improve VW language learning?