PRE-SERVICE TEACHERS IN SECOND LIFE:
ARE DIGITAL NATIVES PREPARED
FOR A WEB 2.0 EXPERIENCE?

by

CHRISTOPHER T. INMAN

A DISSERTATION

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ABSTRACT

Today’s college students, “digital natives,” have had digital technology at their fingertips (Rushkoff, 1996; Prensky, 2001a). Technology habits and expectations of young people are changing; the educational and business worlds have placed a focus on skills called “21st century skills,” to prepare students for the digital age (Lemke, 2002). Skills include collaboration, communication, creativity, problem solving, critical thinking, and technology skills (Partnership for 21st Century Schools, 2009). These skills are being addressed with Web 2.0 digital tools, and one such tool is online virtual worlds.

This study explored experiences of pre-service teachers in a virtual world (Second Life) as the virtual world was introduced into a course. Educators sometimes assume that current undergraduate students (digital natives) should be comfortable using digital technologies; this assumption is not necessarily accurate (Lei, 2009). This study used a concurrent triangulation mixed methods approach, collecting qualitative and quantitative data (Creswell & Plano Clark, 2007). Participants included pre-service teachers in two sections of Technology in Education (TE) 260; they completed three surveys, maintained a journal, and participated in two focus groups.

Students experienced problems with Second Life’s interface (Sanchez, 2009; Schultze et al., 2008). Barriers included distraction/exposure to inappropriate content (Chow et al., 2007; Hayes, 2006), student reluctance to accept Second Life as an education tool, (FitzGibbon et al., 2008; Jarmon et al., 2008; Vogel et al., 2008), and hardware/software requirements (Chow et al.,
2007; Sanchez, 2009). Potential uses identified were student collaboration and brain-storming; uses corresponded with matching 21st century skills.

Students indicated Second Life activities increased confidence with using virtual worlds. Students believed Second Life or another virtual world was a viable educational tool. Although students were prepared to use Second Life operationally, they were not confident in their ability to use Second Life/virtual worlds with future students. Only 26% of students were comfortable using Second Life with future students, and only 18% of students were comfortable using virtual worlds with future students, supporting Lei’s (2009) assertion that pre-service teachers as digital natives are not necessarily comfortable or confident in using newer Web 2.0 technologies.
DEDICATION

I would like to dedicate this study to my family. To my grandmother: thank you for always loving and supporting me. So many years ago your advice helped me begin this journey. To my parents: without your unending love and support this could not have happened. You have always been there for me, and you have always believed in me. Thank you, for everything. To my brother: thank you for your friendship. It has meant a great deal to me. I will always believe in you. To my family members no longer with us: everyday I think about you and the love and support you always gave me. I will never forget you. I love you all.
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CONTENTS

ABSTRACT ........................................................................................................................................... ii

DEDICATION ........................................................................................................................................ iv

ACKNOWLEDGMENTS ....................................................................................................................... v

LIST OF TABLES ................................................................................................................................... xiii

LIST OF FIGURES ................................................................................................................................ xv

CHAPTER I: INTRODUCTION .................................................................................................................. 1

Technology in Education (TE) Sequence: Overview ........................................................................... 2

Virtual Environments ............................................................................................................................. 3

TE 260: Virtual Environments and 21st Century Skills ....................................................................... 4

Statement of the Problem ........................................................................................................................ 5

Purpose of the Study ............................................................................................................................... 5

Nature of the Study ............................................................................................................................... 6

Research Questions ............................................................................................................................... 7

Conceptual Framework ............................................................................................................................ 8

21st Century Skills ............................................................................................................................... 8

Web 2.0 ............................................................................................................................................... 9

Virtual Worlds .................................................................................................................................. 10

Definition of Terms ............................................................................................................................. 11

Assumptions ...................................................................................................................................... 12

Limitations ......................................................................................................................................... 12

Significance of the Study ..................................................................................................................... 13
Summary .......................................................................................................................... 14

CHAPTER II: LITERATURE REVIEW .................................................................................. 15

21st Century Skills ........................................................................................................... 15

Digital Age Literacy ......................................................................................................... 15

Inventive Thinking ........................................................................................................... 16

Effective Communication ............................................................................................... 17

High Productivity ............................................................................................................ 17

Web 2.0 .......................................................................................................................... 19

Virtual Worlds ................................................................................................................ 21

Educators and Virtual Worlds ....................................................................................... 23

Educators and Second Life ............................................................................................. 25

Second Life in Graduate Level Courses ......................................................................... 26

Second Life in Undergraduate Level Courses .............................................................. 28

Potential Educational Uses of Second Life and 21st Century Skills ......................... 33

Collaboration and Communication ............................................................................... 34

Creativity ......................................................................................................................... 35

Distance Education ........................................................................................................ 35

Simulations and Games ................................................................................................. 36

Group Work and Projects ............................................................................................. 36

Community and Social Interaction ............................................................................... 37

Role-Play ......................................................................................................................... 38

Possible Problems with Second Life ............................................................................... 40

Student Acceptance of Second Life as an Educational Tool ..................................... 40
CHAPTER III: METHODOLOGY .............................................................................................. 47

Introduction .................................................................................................................. 47

Research Questions ...................................................................................................... 47

Study Participants and Sample ..................................................................................... 48

Setting of the Study ...................................................................................................... 49

Study Design .................................................................................................................. 51

Role of the Instructor and Proctor .................................................................................. 52

Instructor’s Role ............................................................................................................. 52

Proctor’s Role ................................................................................................................ 53

Part I: Technology Use Pre-Survey ............................................................................. 54

Part II: Scaffolded Second Life Learning Activities .................................................... 54

Part A ............................................................................................................................. 54

Part B ............................................................................................................................. 54

Part III: Virtual World Experiences Survey ................................................................. 55

Part IV: Technology Use Post-Survey ......................................................................... 55

Part V: Second Life Experiences Focus Group ............................................................. 55

Ethical Considerations .................................................................................................. 56

Instrumentation Reliability and Validity ....................................................................... 57
# LIST OF TABLES

1. Potential Educational Use of Second Life ................................................................. 34
3. Possible Problems with Using Second Life ................................................................. 40
4. Research Questions and Corresponding Data Collection Instruments .......................... 74
5. Participants by Gender ................................................................................................. 75
6. Academic Classification (Upper and Lower) ............................................................... 75
7. Participants by Age ....................................................................................................... 75
8. Computer Start Time .................................................................................................... 76
9. Time Daily Spent on a Computer ................................................................................ 76
10. Top Five Reasons Students Use the Internet .............................................................. 77
11. Student Comfort/confidence in Using Technology, Before and After TE 260 ............ 79
12. Mean and Standard Deviation for Items in Table 11 .................................................. 80
13. Paired Differences for Items in Table 11 ..................................................................... 80
14. Cronbach Alpha for the Three Survey Instruments .................................................... 83
15. Item-to-Total Correlations for Three Survey Instruments .......................................... 84
17. Potential Barriers to Using a Virtual World ............................................................... 89
18. Survey Questions and Corresponding 21st Century Skill .......................................... 94
19. Second Life Interventions and Proficiency ............................................................... 100
20. Comfort/Confidence in Using Second Life or Virtual Worlds in Future ................... 105
21. Proficiency Level and Every-day Use Technologies, Pre-survey and Post-survey ........ 106
22. Student Proficiency Level and TE 260 Technologies ............................................. 107
23. Mean and Standard Deviation for Items in Table 21 and Table 22 ...................... 108
24. Paired Differences for Items in Table 21 and Table 22 ...................................... 108
25. Comfort/confidence of Pre-service Teachers in Using Technology, Before and After Course .................................................................................................................... 121
26. Pre-service Teachers’ Perceived Level of Proficiency in Using “Everyday” Technologies .................................................................................................................... 122
LIST OF FIGURES

1. Group Building Project (Solar System Diorama) in Progress.................................................. 128
2. Group Building Project (Greenhouse) in Progress................................................................. 129
CHAPTER I:
INTRODUCTION

Nine years ago Marc Prensky (2001a) coined the term “digital native” to describe today’s generation of K-12 students. A few years earlier, Douglas Rushkoff (1996) made the observation that our current students are native to cyberspace, while everyone else is just an immigrant; they have never known a time without digital technology at their fingertips. Indeed, they have grown up using the Internet, computers, video games, cell phones, social networks such as Facebook or Myspace, as well as various other digital tools. Never before has a generation of young people had such incredible access to a wealth of information and ideas and to people around the world. Now, this generation of digital natives is entering colleges and universities across the United States. A study by the Educause Center for Applied Research (2008) examined today’s traditional undergraduate students to "help inform college and university leaders, technology staff, and faculty as they make critical decisions about their institutions' technology investments and implementation” (Salaway, Caruso, & Nelson, 2008, p. 33). The study found that 80.5% of undergraduate students owned laptops, and that 90.8% of students living on campus owned a laptop. Approximately 66.1% of respondents owned an Internet-capable cell phone. In terms of software usage, 93.4% of respondents used the institution's library website, 91.9% used presentation software, 85.9% used spreadsheets, 85.2% used social networks, 83.6% used text messaging, and 82.3% used course management systems. Clearly, undergraduate students at the college/university level can be considered ubiquitous users of digital technologies.
While the technology habits and expectations of young people have been changing, in the educational and business worlds a focus has been placed on a set of skills, called “21st century skills,” to prepare students for life and work in the digital age (Lemke, 2002). New technologies are flattening our world (Friedman, 2005), making communication instantaneous and shifting our economy from industry and service to one of information. To survive in this environment, students must be able to find, analyze, synthesize and disseminate information. As the global economy changes, a corresponding shift in abilities and skills (21st century skills) occurs simultaneously, as students seek to acquire these skills in order to participate in the digital world (Black, 2009). According to the North Central Regional Educational Laboratory, 21st century skills are organized into four categories: digital age literacy, inventive thinking, effective communication, and high productivity (Lemke, 2002). This study explores undergraduate pre-service teachers, typically between 18 and 22 years of age, as digital natives and their knowledge of 21st century skills and their comfort and confidence level in using a virtual world, a Web 2.0 tool. The Large University’s Technology in Education courses (TE) are designed to provide future teachers (current pre-service teachers) with knowledge of 21st century skills and Web 2.0 digital tools.

Technology in Education (TE) Course Sequence: Overview

Although the TE courses are open to undergraduate students of all majors, the focus of the program is undergraduate education students (pre-service teachers) majoring in the fields of physical, elementary, and special education. All courses within the TE course sequence are delivered online, or in a blended online/physical location offering. The TE sequence begins with TE 101, a course that provides new undergraduate students from across the university with fundamental, basic computer skills, including knowledge about software applications, utilities,
and hardware. However, education major students are not required to complete TE 101. The next course, TE 201, teaches students how to problem solve using hardware and software; students are also introduced to Web 2.0 tools such as blogs and wikis in this course. Finally, the student completes TE 260, described as the “cumulative” course of the TE sequence. All physical education major students are required to complete both TE 201 and TE 260. Elementary education majors have the option completing either Spanish language courses or the TE 201/TE 260 sequence. Special education major students have the same option as elementary education students, but in practice, most special education major students enroll in TE 201/TE 260. In TE 260, students apply current and emerging instructional technologies to solve problems and to create a technology-based unit plan portfolio. These technologies are also referred to as “Web 2.0” technologies (O’Reilly, 2005). Web 2.0 is a broad term that describes the general trend of current technologies being developed to allow users to create original content, rather than merely receive content. TE 260 currently teaches pre-service teachers how to use Web 2.0 tools such as Google Docs, Twitter, SlideShare, Webs (http://www.webs.com), LiveJournal, and Skype.

**Virtual Environments**

One Web 2.0 technology, three-dimensional (3D), immersive virtual worlds, is currently not included in the TE 260 curriculum. Virtual environments are available for people of all ages, from elementary age children to adults. Elementary age students can visit places such as Whyville, Disney-owned Club Penguin, or Webkinz, where they can create an avatar, play games, learn, and communicate with other children. For “tweens,” or middle-school-aged children, virtual worlds such as OurWorld and Dizzywood are available. Locations for teens include Teen Second Life, There, and ThePalace. For adults, Second Life and Active Worlds are two of the more prominent virtual world environments.
Higher education has noticed the potential of virtual worlds in educational contexts; the two most common virtual environments are Second Life and Active Worlds. There are over 80 active education-related worlds on Active Worlds (Active Worlds, 2009, ¶ 3), with institutions such as Cornell University, the University of Cincinnati, and the University of Toronto maintaining worlds or programs inside Active Worlds. According to Linden Lab, the creators of Second Life (SL) there are at least 300 universities around the world that teach courses and/or conduct research inside SL (Michels, 2008, ¶4).

**TE 260: Virtual Environments and 21st Century Skills**

Since TE 260 is a course which teaches students how to use Web 2.0 digital technologies, and virtual worlds can be considered such a tool, it then follows that implementing the use of a virtual world into the course would seem natural. Implementing a virtual world into the course is also relevant because of its potential in addressing 21st century skills. Virtual worlds have been found to support such skills as economic literacy (Castronova, 2008; Wasley, 2008), communication and social skills (Gillen, 2009; Peterson, 2006), problem solving (Mason & Moutahir, 2006), collaboration and community (Margerum-Leys, 2008; Gillen, 2009) and civic literacy (Rycroft, 2007). A few studies have focused on introducing SL into undergraduate and graduate level courses (Brown, Hobbs, & Gordon, 2008; Chow, Andrews, & Trueman, 2007; De Lucia et al., 2009; Delwiche, 2006; FitzGibbon, Oldham, & Johnston, 2008; Gao, Noh, & Koehler, 2008; Hearrington, 2009; Jarmon, Traphagan, & Mayrath, 2008; Lambert & Kidd, 2008; Lester & King, 2009; Mayrath, Sanchez, Traphagan, Heikes, & Trivedi, 2007; Rappa, Yip, & Baey, 2009; Sanchez, 2009). Therefore, the selection of SL as the virtual environment of choice to use in TE 260 will seek to build off of the earlier findings in those studies.
Statement of the Problem

Although current undergraduate students are digital natives and they have grown up using digital technologies, the fact that these students should feel comfortable using these types of technologies for personal and educational uses is assumed, but not necessarily accurate. According to Lei (2009), in this generation “there are people who indeed grow up with technologies, are proficient in using technologies, and feel confident with technologies, but there are also people who did not start using technology at an early age, do not know much about technology, and are less confident in using technology” (p. 93). This study explored efforts to incorporate a virtual world (SL), a current and emerging technology, into an undergraduate education course (TE 260). Evaluating this process will help designers, researchers, and instructors assess efforts to prepare pre-service undergraduate education students to learn and to use digital technologies, including virtual worlds, proficiently. Finally, implementing the use of a virtual world into the curriculum of this course will assist educators in determining potential problems or barriers students may encounter, in identifying potential uses of SL in educational contexts, and in deciding whether using a virtual world in a technology course is worthwhile.

Purpose of the Study

The purpose of the study was to gain an understanding of the experiences of undergraduate pre-service teachers in a virtual world (Second Life) as the virtual world is introduced into a course. The study also allowed the researcher and other educators to gain an understanding of the knowledge of 21st century skills and Web 2.0 tools, which current undergraduate teacher candidates possess both before and after they complete the course. The study also provided an opportunity to identify any problems or successes teacher candidates encounter as they engage with this particular virtual environment (Second Life). Finally, such
activities presented an opportunity to recognize potential educational applications of this particular virtual environment (SL) into a pre-service technology course (TE 260).

A mixed method study approach was selected because it allows for the use of both quantitative and qualitative methods for collecting and analyzing data (Creswell, 2009; Wiersma & Jurs, 2005). Additionally, a mixed method research approach also allows for the ability to assess an implementation process; in this case the implementation of a virtual world into a pre-service technology applications course (TE 260).

Nature of the Study

This study used a concurrent triangulation mixed methods approach to examine and understand the experiences of pre-service teachers as a virtual world was implemented into a Technology in Education (TE 260) course. The concurrent triangulation method gives equal emphasis to both quantitative and qualitative data, and combines them in the interpretation phase that promotes data triangulation (Creswell, Clark, Gutmann, & Hanson, 2008). A mixed methods approach uses both qualitative and quantitative forms of inquiry together to improve the overall strength of the study as compared to using either qualitative or quantitative methods alone (Creswell & Plano Clark, 2007). Implementing a mixed methods approach potentially broadens understanding; it can also assist in explaining or building upon results from the other approach (Creswell, 2009).

This study collected data from multiple sources, both quantitative and qualitative. From the quantitative perspective, a pre-survey (an adapted Technology Use Survey) was administered to establish the entry level of comfort and confidence students had in using Web 2.0 technologies when they first entered the course (TE 260). After students completed in-class Second Life activities, a Second Life Experiences survey was administered to understand student experiences
in using Second Life. Following the Second Life Experiences survey, a post-survey identical to the pre-survey (adapted Technology Use Survey) was administered at the end of the course to determine if student level of comfort and confidence had changed. Qualitative data were collected through the student reflective journal entries and focus group sessions. Students posted responses to prompts on their LiveJournal accounts as they completed Second Life activities during the course. These prompts asked students to reflect upon the Second Life activities completed in Part II of the study. Finally, a focus group session was held at the end of the course to give students an open forum to discuss any successes or problems they experienced while completing the Second Life activities.

By using this approach, it was hoped that the researcher would be able view the study from a variety of perspectives, thereby providing a more complete picture of the process being observed, the implementation of Second Life into the course (Wiersma & Jurs, 2005). It was also hoped that the qualitative data and quantitative data collected would inform and enrich results found from using each method.

Research Questions

The central research question of this study was, “Are undergraduate pre-service teachers who participate in a virtual Web 2.0 experience sufficiently prepared to function in a virtual world?” The following sub-questions were also explored

1) What are the perceived challenges/problems that undergraduate pre-service teachers face when using a virtual world (Second Life);

2) What are the perceived potential educational uses/benefits of a virtual environment (Second Life) in a technology course;
3) Do undergraduate pre-service teachers believe that the Second Life interventions have provided them the proficiency to operate in a virtual environment;

4) Do undergraduate pre-service teachers believe that Second Life (or other virtual worlds) is a viable educational tool/environment; and

5) How confident do undergraduate pre-service teachers feel about using virtual worlds and other digital technologies?

Conceptual Framework

Three key concepts frame the current study. An explanation of each concept is provided below.

21st Century Skills

The concept of 21st century skills began to gain traction with the formation of the Partnership for 21st century skills in 2002. Comprised of major corporations such as Verizon, Dell, Microsoft, and Apple, as well as educational organizations such as the National Education Association (NEA) and the Association for Supervision and Curriculum Development (ASCD), the partnership sought to create a framework resulting in a shared vision for education reform (Formanack, 2008). The framework the partnership produced includes the following skills:

- Information, media literacy, and communication skills;
- Thinking and problem solving;
- Interpersonal, collaborative, and self-direction skills;
- Global awareness;
- Economic and business literacy, including entrepreneurial skills; and
- Civic literacy (Regan, ¶3).
Twenty-first century skills are not new; many of these skills such as problem solving and critical thinking have been a part of human progress throughout history (Rotherham & Willingham, 2009). What is new is “the extent to which changes in our economy and the world mean that collective and individual success depends upon having such skills” (Rotherham & Willingham, 2009, p. 16). In order to succeed in this new digital age, students, the future workforce, must be “fluent in the skills and languages” of ever-changing technologies (Lemke, 2002, p. i).

Web 2.0

According to Solomon and Schrum (2007), Web 2.0 serves as an umbrella term which describes the use of online collaborative, interactive tools designed for users to create and generate content, change content, and easily share content in real time. To understand the concept of Web 2.0, it is first helpful to compare it to Web 1.0. Tim O’Reilly (2005) referred to the World Wide Web’s early years as Web 1.0; during this time, content was delivered online to a passive audience that retrieved information. Web 2.0, then, refers to the change in how we use the Internet and digital tools. In the world of Web 2.0, users do not passively receive information; instead they actively use these tools to collaborate, communicate, participate, and build social networks.

While there has been some debate about whether Web 2.0 exists, it is important to realize that the idea of Web 2.0 is more than digital tools, but rather that the key issue is in how these tools are used by people. It is true that people have been able to send email and chat online since the beginning of the Internet age, but what is different now is access. Through access, first, the skill level required by users to add content to the Internet has greatly decreased; no longer must users learn any type of coding language such as hyper-text markup language (HTML) to add
content since so many drag-and-drop interface programs are available. Second, more online programs are available now that focus on allowing users to actually create content, share content, and build social networks. Web 2.0 tools include tools such as wikis, blogs, digital file sharing sites, social networking sites, and virtual environments or worlds.

**Virtual Worlds**

Investigation into the use of virtual worlds in educational contexts has been in place since the 1970s (Livingstone, Kemp, & Edgar, 2008). In recent years, the adoption of three-dimensional (3D) worlds in education has increased (De Lucia, Francese, Passero, & Tortora, 2009). Dickey (2003) says that 3D virtual worlds can be characterized as “desktop interactive virtual reality within a chat environment” which has the following three main components:

1) the illusion of 3D space;
2) avatars that serve as visual representations of users; and
3) an interactive chat environment (p. 121).

Castronova (2008) defines a virtual world as a “persistent, synthetic, online environment that can be accessed by many users at the same time” (p. 2). Sarah Robbins-Bell (2008) adds that they are hosted over wide area networks allowing for a virtual environment on a global scale, and the world exists whether a person is logged in or not (p. 26). Through the use of an avatar, a virtual representation of the user, individuals interact with the environment and other avatars. The avatar serves as an extension of the person inside the virtual world, and through this extension individuals can engage in simulated experiences in a relatively safe environment.

The concept of 21st century skills has become an important topic in education, particularly in regards to implementing technology into education instruction. Web 2.0 digital technologies, which encourage student-centered product creation, can be used to teach and learn
21st century skills. Since virtual worlds are also considered a Web 2.0 technology, it has the potential to foster 21st century skills, as well as student centered learning and instruction.

Definition of Terms

*Avatar*- a three dimensional (3D) representation of a person inside a virtual environment. Through the avatar, the user explores the virtual environment.

*Digital Native*- individuals (students) who have grown up during the digital age and who have always had digital technology at their fingertips. The term was coined by Marc Prensky (2001a).

*Pre-service teachers*- students enrolled in the teacher education program. Most students enrolled in the teacher education program are undergraduate students, though there is an exception, alternative certification students. An alternative certification student has earned a bachelor’s degree in a non-education field, and is now earning a master’s degree in an education field. For the purposes of this study, pre-service teachers will refer to typical undergraduate pre-service teachers, usually between the ages of 18 and 22, in the fields of elementary education, physical education, and special education.

*Second Life*- Launched by Linden Lab in 2003, Second Life is a 3D virtual environment available online through the Internet. Second Life is not a game; there are no quests or goals to achieve. It is a fully realized 3D world built largely by its users.

*21st century skills*- A set of skills necessary for students to succeed in the digital age. These skills include digital age literacy, inventive thinking, effective communication, and high productivity (Lemke, 2002).

*Virtual World*- An online environment characterized with a built-in chat or text-message feature that provides an illusion of 3D space and which uses an avatar as a representation of the user.
They also exist whether a person is logged in or not and provide access to many users at the same time (Castronova, 2008; Robbins-Bell, 2009).

Web 2.0-An umbrella term used to describe the use of online collaborative, interactive tools designed for users to create and generate content, change content, and easily share content in real time (Solomon & Schrum). Web 1.0 describes the early days of the World Wide Web when people went online to retrieve information; Web 2.0 describes how the World Wide Web is currently used to collaborate, communicate, share, and build communities (O’Reilly, 2005).

Assumptions

There are several assumptions in this study. These assumptions are listed below.

1) It is assumed that in order to more fully understand a phenomenon, a researcher must be immersed in the phenomenon and maintain an objective position.

2) It is assumed that students in this course have mastered basic computer use and possess a general knowledge of software applications used in this course.

3) It is assumed that students will be honest in responding to the surveys, in observations, during interviews, and in posting their blog (journal) entries.

4) It is assumed that students have completed TE 201 prior to enrolling into TE 260.

Limitations

Identifying limitations provides researchers with the opportunity to identify possible weaknesses related to the study (Creswell, 2003). A list of limitations is provided below.

1) Only one virtual environment, Second Life, was used in the study. Other virtual environments might yield different experiences and responses.

2) The study took place during the delivery of a course, from January 2010 to May 2010.
3) Only 43 students are enrolled in two sections, therefore the sample is low. The low sample could potentially impact survey instrument reliability.

4) Students in TE 260 are enrolled in undergraduate programs in the fields of physical education, special education, and elementary education. Students enrolled in other programs/colleges may have had different experiences prior to taking this course. Therefore, results may be different.

Significance of the Study

This study of the implementation of a virtual world (Second Life) into an undergraduate course was significant for several reasons. First, “almost all studies and survey reports on digital natives focus on digital natives as students, especially K-12 students (Lei, 2009, 87).” Few studies have examined pre-service teachers as digital natives. According to Rainie (2006), digital natives are already entering the workforce; some of them are teachers or pre-service teachers (Dutt-Doner, Allen, & Corcoran). Therefore, this study built upon research in this arena by examining pre-service teachers as digital natives.

The study also assisted in answering whether pre-service teachers are identifying and learning 21st century skills. The study also gave educators and researchers a more accurate picture of how comfortable and confident pre-service teachers were with using technology. Furthermore, the study shed light on how students view their own proficiency level in using technology.

Finally, the study was important because it built upon the research base concerning the implementation of a virtual world (Second Life) into an undergraduate course (TE 260). The research sought to identify and confirm problems undergraduate pre-service education students may have in using Second Life. These potential problems include technical issues related to
software and hardware (Delwiche, 2006; McVey, 2008), the potential for students to get lost or distracted by the content and/or other avatars within the environment (Luo & Kemp, 2008; McKay, Van Schie, & Headley, 2008), and possible resistance to accepting a virtual environment as an educational tool (FitzGibbon et al., 2008; Jarmon, Traphagan, & Mayrath, 2008; Lambert & Kidd, 2008).

Summary

Educators assume that because today’s students have grown up in a digital age, and are therefore “digital natives,” that they have used digital tools, and also Web 2.0 tools, and that they feel comfortable and confident in using them. However, as Lei (2009) found, this assumption is not necessarily true. It is also assumed that students will need to learn and use 21st century skills to be successful in the digital age. This study will follow the experiences of undergraduate pre-service teachers (education majors) as they complete a course (TE 260) which focuses on teaching students about 21st century skills and Web 2.0 tools. This study will also follow the experiences of these students as they learn about 21st century skills and Web 2.0 tools as they complete a course (TE 260). It is believed that the study will build upon and extend the research concerning the implementation of a virtual world (Second Life) into an undergraduate university course.

Chapter II of this study reviews current literature in the area 21st century skills and virtual worlds, specifically Second Life. A more in-depth description of the course (TE 260) is also provided. Chapter III describes and outlines the methodology selected to conduct the study. Chapter IV details the data collected from various sources. An analysis of the data detailed in Chapter IV is provided in Chapter V.
CHAPTER II:
LITERATURE REVIEW

In this chapter, a discussion of 21st century skills and virtual worlds is provided. First, a
description of 21st century skills and the components, or sub-skills, of 21st century skills is
presented, along with an explanation of how the National Education Technology Standards
(NETS) designed by the International Society for Technology in Education (ISTE) relate to 21st
century skills. Second, a brief discussion of Web 2.0 is presented. Third, three-dimensional (3D)
virtual worlds are defined. A discussion of how the virtual world Second Life has been adapted
by university/college courses is then discussed. Finally, a brief discussion of pre-service teachers
and technology is provided.

21st Century Skills

According to the North Central Regional Educational Laboratory (NCREL), 21st century
skills are organized into four categories: digital age literacy, inventive thinking, effective
communication, and high productivity (Lemke, 2002).

Digital Age Literacy

The International ICT Literacy Panel (2007) defines digital age literacy as the ability to
use digital tools to access, manage, integrate, evaluate, and create information and solve
problems. Digital literacy includes concepts such as visual and information literacy, multicultural
literacy, and global awareness (Holum & Gahala, 2001; Lemke, 2002). Visual literacy is defined
as the ability to interpret and express ideas using charts, images, videos, and graphics (Lemke,
2002). Information literacy is defined as having the competency to locate, evaluate, and use
information appropriately (Holum & Gahala, 2001; Lemke, 2002). Multicultural literacy means having the ability to recognize and to appreciate a diverse peoples and cultures, as well as being familiar with one’s own history and culture (Bassett, 2005; Lemke, 2002). Exhibiting global awareness means understanding and recognizing the relationships between states, corporations, and people across the world (Bassett, 2005; Lemke, 2002).

**Inventive Thinking**

It has been described that the 1980s brought a transition from an “Industrial Society” to an “Information Society,” and in the 1990s people began to talk about the “Knowledge Society” (Resnick, 2002, p. 36). This shift from information to knowledge is characterized by Resnick (2002) as a move to a “Creative Society” in which “success in the future will be based not on how much we know, but on the ability to act and think creatively (p. 36).” Digital technologies provide opportunities for creative thinking, which is a part of inventive thinking. Inventive thinking includes the ability to manage complexity, creativity, curiosity, risk-taking, higher-order thinking and sound reasoning (Partnership for 21st Century Skills, 2009; Lemke, 2002). The ability to manage complexity refers to the interconnectedness and globalization of today’s world and how students navigate this environment by planning, managing, and adapting (Lemke, 2002, p. 2.1). Creativity refers to using one’s imagination to create new ideas, and curiosity refers to one’s desire to continue learning over the course of a lifetime (Lemke, 2002). Lewis and Smith (1993) define higher ordering thinking as occurring “when a person takes new information and information stored in memory and interrelates and/or rearranges and extends this information to achieve a purpose or find possible answers in perplexing situations” (Herrington & Oliver, 1999, p. 136). Lemke (2002) adds that higher order thinking is a process of creative problem solving that leads to sound judgments and conclusions (p. 2.3).
Effective Communication

Web 2.0 tools such as wikis, blogs, file sharing, social networking, and virtual worlds encourage and foster a communication and collaboration (De Lucia et al., 2009; Delwiche, 2006; McPherson, Wang, Hsu, & Tsuei, 2007). Effective communication includes topics such as teaming, collaboration, interpersonal skills, personal and social responsibility, and interactive communication (Lemke, 2002). Teaming, collaboration, and interpersonal skills are interrelated; they focus on the ability to work effectively with others to solve problems and devise solutions (Lemke, 2002; Partnership for 21st Century Skills, 2009). Individuals and groups must also be socially responsible with how they use technology, such as using technology for the public good, following copyright laws, and protecting children from inappropriate Internet content.

High Productivity

With the influx of new technologies, expectations placed upon students and employees to produce high-quality work quickly and efficiently have increased. The category of high productivity includes the ability of individuals to plan and manage for results, to use real world tools effectively, and to produce high-quality products (Bassett, 2005; Lemke, 2002).

The concept of 21st century skills has also been adapted for, and implemented into, education. The Partnership for 21st Century Skills (2009) developed a framework with four principle components: core subjects and 21st century themes, learning and innovation skills, information, media and technology skills, and life and career skills. Core subjects and 21st century themes include mastery of core subjects (mathematics, sciences, language arts, economics, geography, history, government, etc.), global awareness, financial, economic, business, and entrepreneurial literacy, civic literacy, and health literacy. Learning and innovation skills include creativity and innovation, critical thinking and problem solving, communication
and collaboration. Information, media, and technology skills include information literacy, media literacy, and information, communications, and technology literacy. Life and career skills include flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, leadership and responsibility.

The International Society for Technology in Education (ISTE) also has produced the National Educational Technology Standards (NETS) for students. The NETS standards produced by ISTE are related to NCREL’s 21st Century Skills (digital age literacy, inventive thinking, effective communication, and high productivity) in two ways. First, the “NETS encompass technology literacy,” which is one of the literacies listed under digital age literacy (McAnear, 2003, p. 4). Second, the “NETS also emphasize the role of technology in productivity, communication, and problem solving (McAnear, 2003, p. 4).” In 2007, ISTE updated its NETS for students. They include the following standards:

1) Creativity and innovation;
2) Communication and collaboration;
3) Research and information fluency;
4) Critical thinking, problem solving, and decision making;
5) Digital citizenship; and
6) Technology operations and concepts. (International Society for Technology in Education, 2007)

Students are expected to learn these skills in order to succeed. Pre-service teachers are expected to learn these skills in order to pass these skills on to their future students. By learning how to use Web 2.0 tools, or digital age tools, such as social networking sites, file sharing, blogs, and wikis, pre-service teachers are learning how to potentially implement both the tools and 21st
century skills into their teaching. One such Web 2.0 tool that has the potential to teach these skills and promote 21st learning such as communication (Gillen, 2009; Margerum-Leys, 2008) collaboration and teaming (Delwiche, 2006; Mayrath et al., 2007), and problem solving (Brown et al., 2008, Luo et al., 2008) is three dimensional (3D), immersive virtual worlds.

Web 2.0

Before moving onto virtual worlds, however, a word must be said about Web 2.0. The concept of Web 2.0 began in the early 2000s, particularly after the “dot.com” bubble burst (O’Reilly, 2005). Web 2.0 serves as an umbrella term which describes the use of online digital tools designed for users to generate new content and share content easily in real time (Solomon & Schrum, 2007). To understand the concept of Web 2.0, it is first helpful to compare it to Web 1.0. The World Wide Web’s early years have been described as Web 1.0, as content was delivered online to a passive audience that retrieved information (O’Reilly, 2005). Web 2.0, then, refers to the change in how we use the Internet and digital tools. In the world of Web 2.0, users do not passively receive information; instead they actively use these tools to collaborate, communicate, participate, and build social networks.

There has been some debate about whether Web 2.0 exists. Indeed, Tim Berners-Lee sees little difference between Web 1.0 and Web 2.0, and believes that no one really knows what Web 2.0 means (Anderson, 2006). It is important to realize, however, that the idea of Web 2.0 is more than digital tools and the Internet, but rather that the key issue is in how these tools and the Internet are used by people. In fact, the top-down approach that characterized Web 1.0 has been replaced by Web 2.0 where users build information from the bottom-up (Mills, 2007). “Bottom-up” refers to recent trends of technologies designed specifically for users to build and create new products or information from the bottom-up, initiated by the user. The clearest examples of Web
2.0, bottom-up technologies are YouTube (http://www.youtube.com) and Wikipedia (http://www.wikipedia.com). Both technologies were designed specifically for users to create the content. Without user-generated movies, YouTube would not exist. Without user entries and contributions, Wikipedia would not exist. In direct contrast to “bottom-up” Web 2.0 technologies are top-down technologies controlled by corporations and business. For example, Encyclopedia Britannica, while offering online service to users, still controls the content of the encyclopedia; only selected experts and editors are allowed to contribute to it. Another example is Hulu (http://www.hulu.com), an online television/movie service provided by a joint venture between Fox, NBC, ABC, and other networks. Content on Hulu is completely controlled by the networks; the general public is not permitted to contribute original content to Hulu. While Web 1.0 focused on software, Web 2.0 focuses on sharing information and thoughts through self-publishing (Mills, 2007; O’Reilly, 2005).

The shift from Web 1.0 to Web 2.0 has also changed how educators view the implementation of digital tools into teaching and curriculum. Students now have the power to change content on the Web and even to create new content; they can even create and collaborate with others over the Internet in real time (Criswell, 2008). Web 2.0 tools and applications have incredible potential in education because they are easy to use and they easily support collaboration and communication (Coutinho, 2009). Educators know that Web 2.0 tools such as wikis, blogs, digital file sharing sites, and social networking sites have the potential to teach students 21st century skills (Discipio, 2008; Nussbaum-Beach, 2008; Pascopella, 2008). One Web 2.0 tool that has the potential to teach students 21st century skills is three-dimensional virtual worlds.
Virtual Worlds

Virtual worlds are online, 3D environments that provide individuals with the opportunity to meet people and to form communities. Through the use of an avatar, a virtual representation of the user created by the user, people interact with others, collaborate, and create. Virtual worlds, unlike video games, are open-ended; there are no structured storylines or competitive events to complete as is the case with games and gaming (Bartle, 2003).

According to Welch (2008), virtual worlds can be divided into four quadrants along two axes; on one axis are “general purpose” and “specific function,” and on the second axis are “private use” and “public use” (p. 12). Virtual environments such as Second Life and Active Worlds are public and general purpose; public because they are open to all adults, and general purpose because people have the ability to create and do almost anything within the 3D environment. Games such as military simulators are considered closed and specific function; closed because only individuals chosen by the designer can play the game and specific function because the game serves a specific goal of training military personnel (Welch, 2008). Video games such as World of Warcraft are considered public and specific function: public because the game is open to anyone, and specific function because users seek to achieve specific goals in the form of quests. Finally, there are virtual environments that are considered private and general purpose; private because only specific personnel such as students or employees can enter, and general purpose because individuals are free to do as they please (Welch, 2008).

Nevertheless, games and virtual worlds do have some common characteristics. According to Book (2004), there are six distinct features that games and virtual worlds share. They include the following:
1) Shared space: the world allows many users to participate at once;
2) Graphical User Interface (GUI): the world depicts space visually, ranging in style from 2D cartoon imagery to more 3D immersive environments;
3) Immediacy: interaction takes place in real time;
4) Interactivity: the world allows users to alter, develop, build or submit customized content;
5) Persistence: the world’s existence continues regardless of whether individual users are logged in; and
6) Socialization/Community: the world allows and encourages the formation of in-world social groups like guilds, clubs, cliques, housemates, etc. (Book, 2004, p. 2)

Despite these similarities, online 3D virtual worlds are different from games in a number of ways. First, as previously mentioned, virtual worlds are primarily open ended, with no specific goals or objectives for individuals to achieve. Second, the virtual world exists as a social space whereby the primary aim is for the user, through an avatar, to socialize and communicate with other people. Third, virtual world environments are almost completely customizable; the environment itself can be molded and changed to the user’s liking. Fourth, users can actually live another life inside of the virtual world; users can own property such as homes and cars, seek employment, and get married. The virtual world is at the user’s disposal.

There are a number of virtual worlds available to people of all ages (Virtual World Review, 2006). For elementary age children, sites such as Club Penguin and Webkinz are popular destinations. In Webkinz, users choose an avatar in the form of a stuffed animal; the child must then take care of the animal as though it were a real pet. In Club Penguin, children choose a penguin as an avatar. In both worlds, kids can interact with other kids and play
educational games. Whyville, another online virtual environment for kids age 8 to 15, allows kids to earn virtual currency in the form of “clams;” these clams can be used to purchase items to improve their virtual life. They also have the ability the go to in-world events, play educational games, and run their own virtual business. For tweens, kids in the middle school grades, worlds such as Dizzywood and OurWorld are available. For teens age 13 to 17, There (http://www.there.com) and Teen Second Life provide safe virtual world environments whereby teens can communicate with other teens and design and build anything they can imagine. The two more widely known online virtual destinations for adults are Active Worlds and Second Life.

Educators and Virtual Worlds

Educators are being drawn to virtual worlds for various reasons. Three dimensional virtual worlds provide opportunities for synchronous communication and collaboration, which lends itself well as a tool for distance learning (Kemp & Livingstone, 2006). Virtual worlds also have the potential to encourage experiential and constructivist learning. Rather than passively receiving knowledge, constructivism says that learners actively construct knowledge, and that collaboration and negotiation among learners is encouraged by discussion (Vygotsky, 1978). Dede’s (1995) research found that virtual environments have the potential to allow users to learn by doing. Three dimensional virtual worlds also support constructivist learning because users interact not only with other users, but with the environment as well (Dickey, 2003). Researchers Mason and Moutahir (2006) applied Rogers’ (1969) experiential learning theory to successfully create a project-based multidisciplinary program inside Second Life.

Research opportunities are another reason why educators are looking to virtual worlds. Educators are conducting research in virtual worlds for three reasons: to study “participants’
affective domain, participants’ learning outcomes, and participants’ social interaction” (Hew & Cheung, 2008, p. 9). By studying the affective domain, researchers are interested in understanding learner attitudes and feelings regarding the use of immersive virtual worlds as educational learning environments. A study by Cooper (2007), for example, reviewed student opinions concerning the effectiveness of a game created in Second Life called “Nutrition Game.” Cooper found that most students viewed the game in a positive light. Similarly, Martinez, Martinez, and Warkentin (2007) lectured students inside Second Life and surveyed their students to determine the lecture venue’s effectiveness. A majority of the students indicated that they enjoyed it because they thought using Second Life was innovative.

Learning outcomes, or whether 3D virtual worlds can help students learn, is another area of interest to educators. Cooper (2007) found that most of the surveyed students believed the game was “engaging and informative” (p. 49). Holmes (2007) investigated the use of scripted, animated 3D software agents inside a virtual environment to see whether it would improve student learning. While issues were apparent, students indicated that the agents helped them learn. Educators are additionally interested in whether 3D virtual worlds facilitate social interaction among and between students, as well as whether students use various communication features associated with specific 3D virtual environments. Peterson (2006) examined non-native speakers (students who do not speak English as their first language) as they communicated and interacted with each other inside the 3D environment Active Worlds. The researcher found that students used the communication tools/features available to them and that the tools promoted learner-to-learner interaction.
Educators and Second Life

With interest in virtual worlds by educators on the increase, one 3D immersive environment chosen by educators is Second Life, launched by Linden Lab in 2003. According to a video on Second Life’s website, Second Life (SL) is an online virtual environment where people can go to connect, to shop, to work, to love, to explore, to be different, to be yourself, to free yourself, to free your mind, to change your mind, to change your look, to love your look, and to love your life (Linden Lab, 2009). Second Life is “an open-ended environment in which players themselves design the world, its objects, and their behaviors” (Delwiche, 2006).

Educators are choosing SL because they believe that the environment presents a high degree of realism coupled with minimal risk, it provides a venue for informal learning situations (Pence, 2007), it allows for the manipulation of space and time while being limited only by the user’s imagination (Vogel, Guo, Zhou, Tian, & Zhang, 2008), and because it has received noticeable attention in the media (FitzGibbon et al., 2008). Non-profit educational institutions such as the International Society for Technology in Education (ISTE) and the New Media Consortium (NMC) both maintain islands within SL. Several universities and colleges, including Notre Dame University and the University of North Carolina, maintain a presence inside SL as well. One college system has chosen to implement a system-wide plan to incorporate SL. In August 2009, 16 institutions in the University of Texas System met to lay the foundations for the Virtual Learning Community Initiative (VLCI) (Virtual Learning Community Initiative, 2009). The initiative, funded by the University of Texas System Transforming Undergraduate Education grant, seeks to extend operations of “each of the 16 UT campuses into the online virtual world of Second Life” (Virtual Learning Community Initiative, 2009, ¶1).
One need only to conduct an internet search with the phrase “education in Second Life” to find a number of websites and resources dedicated to providing resources and assistance to educators looking to get started in SL. One such wiki, Second Life Education Wiki, which can be found at http://www.simteach.com, provides a list of educational institutions in SL as well as resources for researchers and educators. A few email listservs are also available. One listserv for educators is called The SLED List, meaning Second Life Educators; it can be found at https://lists.secondlife.com/cgi-bin/mailman/listinfo/educators. Another listserv for researchers is called The Second Life Research Listserv and can be found at http://list.academ-x.com/listinfo.cgi/slrl-academ-x.com. Finally, a listserv specifically for educators who work with teens aged 13 to 17 called the Educators and teens list can be found at https://lists.secondlife.com/cgi-bin/mailman/listinfo/educatorsandteens.

Second Life in Graduate Level Courses. From a research perspective, a few studies have focused upon incorporating Second Life into graduate college/university courses. In a study by Chow, Andrews, and Trueman (2007), nine graduate students in a face-to-face course studying online collaboration tools used and examined SL as an educational tool. The students noted several positive aspects of SL including facilitating access to information resources, its stimulating interactive learning environment, allowing users to experience learning (rather than merely reading text), its ability to connect people to other people and organizations located anywhere in the world, the possibility of taking virtual field trips, and its ability to function as an online learning environment for students. Students, however, also indicated negative characteristics including hardware and software issues, the potential to waste time off task, and the fear of completely replacing face-to-face human interaction with a virtual environment.
Hearrington (2009) decided to use SL to deliver an online course to 17 graduate students in an educational leadership program. During the course, students were required to attend class inside SL as well as construct a building inside SL. To measure basic skills required to move inside SL, the researcher designed a “Maze Task” whereby students were required to perform specific tasks including navigating through a door, flying and landing in a specific place, taking a picture of their avatar and emailing it to the professor, answering a question on a note card, and teleporting to another location in SL (Hearrington, 2009). To measure student building skills, the researcher designed a “Chair-Building Task” in which students were given a model of a chair and then asked to replicate the design in SL. Results showed that the perceived mental effort of students on the Maze Task improved after a six-week period, but students still perceived the SL environment as being difficult to interface. Further, learning efficiency improved on both tasks; general computer self-efficacy of the participants also improved. Overall, the researcher found that SL could potentially encourage engagement in adult learners, support synchronous online learning, and provide a platform to create simulated learning environments.

A research team from the University of Texas at Austin implemented SL into a “project-based graduate interdisciplinary communication course” (Jarmon et al., 2008). Working as an interdisciplinary team, students initiated a “collaboration with the Basic Initiative and a group of architecture students to create a virtual presence in SL of two, green, sustainable housing designs called the Alley Flats” (Jarmon et al., 2008, p. 162). Inside of SL, the team went on field trips to visit other communities; they communicated with architects, academics, and non-academics during the process. The virtual model homes built by the students inside SL were also built in a low-income neighborhood in Austin, Texas. Student perceptions of SL were mixed. From a positive perspective, students believed that SL was effective as an instructional tool, SL was
important in increasing their learning, and the team project was an enjoyable, engaging experience. From a negative viewpoint, student opinion was mixed as to SL’s ability to facilitate communication and collaboration; only half of the team thought the project was relevant to course content, and most believed that SL was difficult to use.

Lambert and Kidd (2008) taught a graduate course called *Using the Internet in the Classroom*, with the goal being to “determine the cognitive load of particular Web 2.0 technologies and related course activities based upon learners’ prior experience in distance education, level of technology experience, and initial anxiety about taking a distance education course” (p. 2). There were twelve graduate students in the course; six master’s students and six doctoral students. The wiki-based course was divided into eleven weekly units with a different topic/technology in each unit. The course covered various Web 2.0 technologies such as gaming, blogging, podcasting, social networking, and virtual reality; SL was one of the technologies explored and studied during the course. Students indicated that while they did not consider SL to be too difficult or stressful, they did not see the value in using SL for educational purposes.

*Second Life in Undergraduate Level Courses.* A few notable studies incorporating SL into undergraduate college/university courses have also occurred. In a study by Lester and King (2009) researchers compared a section of a course delivered using traditional face-to-face instruction with another section of the same course facilitated by Blackboard and SL. Approximately 161 undergraduate students attended the face-to-face section, and 173 students attended the distance section facilitated by Blackboard and SL; a total of 194 surveys were collected. Additionally, 97 pretests and 64 posttests were collected from students in the traditional section; 86 pretests and 87 posttests were collected from students in the distance section. On the pretest, 59% of students were communication majors, and 41% were from other
departments. On the posttest, 57% percent of students were communication majors and 43% were from other departments. Overall, student experience in the online course compared favorably with student experience in the traditional course. While students exhibited favorable attitudes in the traditional course at a level slightly higher than students in the online course, the attitude level of the online students remained consistent throughout the course.

Brown, Hobbs, and Gordon (2008) studied the concept of group work inside SL. Twelve first-year undergraduate students in a Level 1 Computer Gaming and Animation Technology degree program with no prior SL experience were asked to participate in the program. The students were divided in three groups of four; they were tasked with forming a group identity, going on a treasure hunt to locate specified objects in SL, and competing in a building competition. Results showed that students were engaged in independent learning, but they were not always on task. Communication between students proved to be seamless between the classroom and inside SL and a considerable amount of demonstration and sharing were carried out in-world. Overall, SL proved to be a potential platform for open-ended learning and field trip activities, though designing such activities in this virtual environment could prove challenging. As a result of the study, the authors saw the potential of SL to lend itself to online distance learning, task-based learning, autonomous learning, and peer-to-peer learning.

Like Jarmon et al. (2008), who conducted a study in SL with undergraduate students in communications, Delwiche (2006) also conducted a study with communications students. In 2004, the researcher (Delwiche) taught a course on game design to 15 undergraduate communications students using SL. Students were split into three development teams of five students each; in each group students took on various roles ranging from narrative development to avatar customization to scripting with the ultimate goal of creating a game inside SL. Based
upon the study, Delwiche (2006) made several recommendations, including identifying course objectives at the outset, giving students a series of smaller steps to complete based upon game mechanics, and warning students of the potential to become addicted to the gaming environment.

De Lucia et al. (2009) sought to describe how a virtual campus in SL could increase group work, communication, and peer-to-peer interaction. To this end, researchers recommended that four distinct types of spaces be created in SL: a) a common student campus, b) collaborative zones, c) recreational areas, and d) lecture rooms (De Lucia et al., 2009, p. 221). To test their design, 26 students in a Fundamentals of Computer Science course attended lectures in SL. On the real world campus the students were divided into two computer labs while the teacher was in a different room. The teacher lectured inside SL; students were allowed to ask questions using the text chat function, while the teacher responded using the voice chat function. Results from the experiment indicated that SL successfully supported social interaction and synchronous learning.

FitzGibbon et al. (2008) examined student teacher use of video-sharing websites, social networking sites, and multi-user environments (MUVEs), specifically SL, in the context of SL helping Irish student teachers become change agents. Students were provided with a questionnaire, which asked them whether they saw any potential educational value in exploring SL. They were also required to give reasons for their answers. According to the results, most Irish student teachers in the study had not even heard of SL and few had entered SL; only five out of 243 Irish student teachers had entered SL just once. Twenty-eight computer science students were also included in the study, with more favorable results; seven students indicated that they had entered SL and six additional students said that they knew about SL. Education students indicated that it would be dangerous to have an alter-ego (i.e., an avatar), SL should be
viewed strictly as a game rather than a ‘second life’, and that SL was a waste of time and a “big farce” (FitzGibbon, 2008, p. 7).

A study by Mayrath et al. (2007) piloted the use of SL into a two-semester, freshman world literature and rhetoric course. A total of 18 freshmen participated in completing two tasks inside SL, one per semester. During the first semester, students were required to study the architecture on their real-world campus, write about the architecture, and then build their ideal campus inside SL while explaining their reasoning for their “ideal” creations. During the second semester, students were required to write essays about their ideal role model (i.e., Malcolm X, Shakespeare, etc.), customize their SL avatar appearance to look like their role model, and then take on the persona of that role model inside SL while explaining leadership from that role model’s perspective. After completing the building task, students indicated that the activity did not increase their engagement in the course, that they had difficulty connecting the SL activity to course content, that they did not find the SL interface to be intuitive, and that they were unprepared to complete the task. Based upon the data received from the first activity, the authors attempted to simplify the next activity (i.e., the role model activity) in order to more accurately reflect course objectives, to capitalize on existing student skills in SL, and to more clearly explain the rationale for completing the activity. Due to these changes, students reported a more favorable experience with SL. Overall, students indicated that the activity was engaging and relevant to course content, and that it provided a better learning experience. They also enjoyed interacting with other avatars more than building in SL, and they preferred working together as opposed to working alone in SL.

Sanchez (2009) conducted follow-up focus groups with the same group of 18 students from Mayrath et al. (2007). The researcher’s goal was to understand the student user experience
of SL. After being provided with a stack of note cards, students were asked to write one thought or experience regarding SL per card. Once completed, note cards were taped to the wall. A total of 215 cards were posted and then categorized into 10 affinities. One affinity identified was SL’s difficult learning curve, as students experienced technical difficulties due to SL’s heavy software requirements, as well as problems with SL’s interface. Students also experienced a disconnect between their own pre-conceived expectations of SL and the actual initial experience of SL; they were expecting to “play” SL as they would play a game such as Grand Theft Auto and were therefore disappointed that SL was not what they had envisioned. Despite these frustrations, students did identify several positive aspects of SL. First, students liked the process of creating their avatars; some students chose to design avatars to resemble their real self, while others chose to design different looks. Second, they believed that SL promoted a sense of creativity; they enjoyed the visual assignments as well as having to force themselves to think creatively and in different ways. Third, even though building was difficult, students were proud of what they achieved and created.

Similar to Mayrath et al. (2007), other studies have been conducted in which students were engaged in role-playing activities inside SL. In Rappa, Yip, and Baey (2009), researchers at a junior college in Singapore asked students aged 17 to 18 over the course of two terms to engage in role-playing activities in SL. During the first term, students in groups of four or five role-played as weight-conscious teenagers who reached adulthood and then faced issues such as euthanasia. During the second term, the same groups of students role-played as members of an interest group in a newly democratic nation; they discussed and negotiated with other groups the conditions and parameters by which to impose the process of embracing globalization on the new nation. Researchers noticed that, in the first term, students were not using physical gestures in SL.
as they would in the real world; therefore, a model of negotiation was adapted for the second term. Tasks in SL were designed to encourage negotiation among students in their SL persona; students had to listen to the perspectives of others, understand multiple points of view, and re-evaluate their own position. Students were also asked to examine why their opinions differed from the opinions of others, as well as review their own contribution to the discussions and negotiations.

Gao et al. (2008) compared face-to-face role-play to role-play in SL. In the study, 36 undergraduate student volunteers participated in a face-to-face role-play activity and a similar SL role-play activity; students had no previous experience with SL. The face-to-face activity focused on the concepts of ability-attribution and effort-attribution; the SL activity focused on intrinsic and extrinsic motivation. The 36 students were divided into 12 teams, three students each. In each group, one student played the role of a teacher, one student played a highly motivated student, and one student played a less motivated student. Results showed no significant difference between the number of words in both activities, but in both instances the teacher role used the most words. Students in the SL activity took significantly more turns than the face-to-face activity, but students in the SL activity used far fewer words than the face-to-face activity. Overall the study showed that there was no difference in the amount of communication between the face-to-face activity and the SL activity.

_Potential Educational Use of Second Life and 21st Century Skills_

Several studies have found potential uses for Second Life in educational contexts (see Table 1). These possibilities include collaboration, creativity, distance education, simulations and games, group work and projects, community and social interaction, and role-play. These possibilities also connect to several 21st century skills (see Table 2).
Table 1

*Potential Educational Use of Second Life*

<table>
<thead>
<tr>
<th>Potential Use</th>
<th>Studies</th>
</tr>
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<tbody>
<tr>
<td>Collaboration/Communication</td>
<td>Brown et al., 2008; Chow, et al., 2007; Jarmon et al., 2008; Mayrath et al., 2007</td>
</tr>
<tr>
<td>Creativity</td>
<td>Chow, et al., 2007; Delwiche, 2006; Jarmon et al., 2008; Mayrath, et al., 2007; Sanchez, 2009</td>
</tr>
<tr>
<td>Distance Education</td>
<td>Brown et al., 2008; Chow et al., 2007; Luo et al., 2008.</td>
</tr>
<tr>
<td>Simulations/Games</td>
<td>Cooper, 2007; Delwiche, 2006; Franklin et al., 2007; Yellowlees et al., 2006.</td>
</tr>
<tr>
<td>Group work/Projects</td>
<td>Brown et al., 2008; Delwiche, 2006; Good, Howland, &amp; Thackray, 2008; Jarmon et al., 2008; Mayrath et al., 2007.</td>
</tr>
<tr>
<td>Community/Social Interaction</td>
<td>De Lucia et al., 2009; Delwiche, 2006; Gillen, 2009; Margerum-Leys, 2008; Rappa, Yip, &amp; Baey, 2009; Rycroft, 2007.</td>
</tr>
<tr>
<td>Role Play</td>
<td>Gao et al., 2008; Mayrath et al., 2008; Rappa et al., 2009.</td>
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</table>

*Collaboration and Communication.* The Partnership for 21st Century Skills lists collaboration and communication as important skills that students must learn. Several studies found Second Life to be a collaborative and communicative space. In De Lucia et al. (2009), researchers designed four distinct areas, one of which was a “collaborative zone” (p. 232). In Jarmon et al. (2008), a group of graduate students formed an interdisciplinary team and collaborated with architecture students to create virtual homes. Students in Mayrath et al. (2007) collaborated to build inside SL and to role-play historical role models; although students did not
enjoy the building activity, they did respond well to the role-play activity. In Rappa et al. (2009), students collaborated together in role-play activities. According to Chow et al. (2007), Second Life provides students with opportunities to seek virtual information synchronously while also participating in discussion with peers or instructors.

Creativity. According to the Partnership for 21st Century Skills, creativity refers to the student’s ability to think creatively, work creatively with others, and to implement creative ideas (Partnership for 21st Century Skills, 2009b). Students exhibit creativity when they edit and change their avatar (Chow et al., 2007; Sanchez, 2009), when they create or build new objects within Second Life (Brown, 2008; Hearrington, 2009; Jarmon et al., 2008), when they design simulations and games (Delwiche, 2006; Franklin, 2007), and when they take on new roles or identities within the virtual environment (Gao et al., 2008; Mayrath et al., 2008; Rappa et al., 2009).

Distance Education. In distance education, learners need interaction with other classmates to encourage student motivation and to support student learning (Threlkeld & Brzoska, 1994). Recent research suggests that students who are successful in online, distance environments are independent learners, are highly motivated by intrinsic sources, and have strong skills in the areas of time management, literacy, and technology (Barbour & Reeves, 2009, p. 413). Second Life supports student interaction and provides a sense of “presence” or a feeling of “being there” that two-dimensional technologies lack (DeLucia et al., 2009, p. 222). Brown et al. (2008) found that “virtual online environments lend themselves to distance learning” (p. 9). In Luo et al. (2008), college faculty indicated that Second Life could be successfully implemented as a “multi-channel distance learning platform” (p. 158). Chow et al. (2007) notes that distance programs can “utilize this virtual world at little or no cost for its
Simulations and Games. Well-designed video games teach players how to solve problems, and to reflect on the design of, and the relationships in, the fictional video game world (Gee, 2003). According to Good et al. (2008), Second Life has the potential to support situated, active learning through the use of simulations. In Franklin et al. (2007), college students designed science gaming/simulation modules in Second Life for middle school students. Students indicated that they liked the games and that they wanted to continue playing them so that they could raise their score. Overall, student performance on tests improved as well. Teams of communication students in Delwiche (2006) designed games in Second Life as a culminating course project to prove what they had learned in the course. Games designed by the students included a pirate-themed scavenger hunt and a three-dimensional maze with Pac-Man-like creatures (Delwiche, 2006, p. 167). College students in Cooper (2007) played a game created in Second Life called “Nutrition Game,” in which students selected food items to calculate caloric intake. Yellowlees and Cook (2006) created simulations of a patient suffering from schizophrenia so that visitors could experience the condition from the patient’s perspective. Games and simulations correspond well to the Partnership for 21st Century Learning’s category called “Information, Media, and Technology Skills.”

Group Work and Projects. Project-based learning is an approach to teaching in which students work together in groups to answer real-world problems. In the process, students use cross-curriculum skills, organize and plan the project, and communicate with peers (Edutopia Staff, 2008). In Second Life, teams of students have successfully constructed architectural models (Jarmon et al., 2008), participated in building/construction competitions and journeyed
on treasure hunts (Brown et al., 2008); collaborated with learning institutions to design content-related learning experiences (Good, 2008), and created games (Delwiche, 2006). According to the Partnership for 21st Century Skills’ framework, skills used in project-based learning and group work correspond with two categories, “Life and Career Skills” and “Learning and Innovation Skills.”

**Community and Social Interaction.** The creation of a virtual social space where students can meet and interact is an important part of learning (Berge & Collins, 1995). Furthermore, according to Barker (1994), interaction is important in acquiring knowledge. Second Life has been shown in several instances to promote social interaction with the idea of a “virtual community.” Gillen (2009) discusses the Schome project inside Teen Second Life, the section of Second Life open only to teens ages 13 to 17. Schome Park, first opened in 2007, was specifically created as a learning community for teens; the project seeks to “give people a lived experience of radically different models of education” (Schome, 2008, ¶7). In De Lucia et al. (2009), researchers created recreational areas with multi-player games designed to encourage informal socialization and communication. Margerum-Leys (2008) explores communities in Second Life in the form of religious houses of worship. In Delwiche (2006), students worked together to create games in Second Life and in the process they eventually thought of themselves as community residents. In correlating community and social interaction to the Partnership for 21st Century Skills’ framework, the categories “Global Awareness” and “Civic Literacy” correspond favorably. NCREL’s categories of “Digital Age Literacy” and “Effective Communication” also correspond well to community and social interaction.

**Role-Play.** The immersive nature of Second Life allows learners to “experiment with new identities in the form of role-play” (Good, et al., 2008, p. 165). In Mayrath et al. (2007), students
took on the role of their leader of choice, edited their avatar’s appearance to resemble the famous person, and then delivered a presentation on leadership from their leader’s perspective. Role-play in Second Life has also been implemented in the context of teachers interacting with both motivated and unmotivated students (Gao et al., 2008). Role-play activities have also been conducted with students taking on the role of teens dealing with dieting and weight issues, and issues the teen would later face as an adult (Rappa, Yip, & Baey, 2009). Because role-play can encompass many different scenarios, it could conceivably compare to any number of twenty-first century skills as identified by both NCREL and the Partnership for 21st Century Skills. Table 2 displays the connection between potential uses of Second Life and 21st century skills.
## Table 2

*Potential Educational Use and 21st Century Skills*

<table>
<thead>
<tr>
<th>Potential Use</th>
<th>21st Century Skill (Partnership for 21st Century Skills)</th>
<th>21st Century Skill (North Central Regional Educational Laboratory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration/Communication</td>
<td>Learning and Innovation Skills</td>
<td>Effective Communication Skills</td>
</tr>
<tr>
<td>Creativity</td>
<td>Learning and Innovation Skills</td>
<td>Inventive Thinking Skills</td>
</tr>
<tr>
<td>Distance Education</td>
<td>Information, Media, and Technology Skills</td>
<td>Digital Age Literacy</td>
</tr>
<tr>
<td></td>
<td>Life and Career Skills</td>
<td>Effective Communication Skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High Productivity</td>
</tr>
<tr>
<td>Simulations/Games</td>
<td>Information, Media, and Technology Skills</td>
<td>High Productivity</td>
</tr>
<tr>
<td>Group work/Projects</td>
<td>Life and Career Skills</td>
<td>Effective Communication Skills</td>
</tr>
<tr>
<td></td>
<td>Learning and Innovations Skills</td>
<td>High Productivity</td>
</tr>
<tr>
<td>Community/Social Interaction</td>
<td>Global Awareness</td>
<td>Digital Age Literacy</td>
</tr>
<tr>
<td></td>
<td>Civic Literacy</td>
<td>Effective Communication Skills</td>
</tr>
<tr>
<td>Role Play</td>
<td>Any of the 21st Century Skills</td>
<td>Any of the 21st Century Skills</td>
</tr>
</tbody>
</table>
Possible Problems with Second Life

Although potential educational uses of Second Life were identified by researchers, potential problems with or barriers to using Second Life were also noted (see Table 3). They include user acceptance of Second Life as an educational tool, hardware and software problems, a steep learning curve, and distraction and possible exposure to inappropriate content in Second Life.

Table 3

Possible Problems with Using Second Life

<table>
<thead>
<tr>
<th>Problem/Barrier</th>
<th>Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student acceptance of Second Life as an educational tool/environment</td>
<td>FitzGibbon et al., 2008; Jarmon et al., 2008; Lambert et al., 2008; Vogel et al., 2008.</td>
</tr>
<tr>
<td>Technical problems (hardware/software)</td>
<td>Chow et al., 2007; Franklin et al., 2007; Luo et al., 2008; Sanchez, 2009; Schultzze, Hiltz, Nardi, Rennecker, &amp; Stucky, 2008.</td>
</tr>
<tr>
<td>Steep learning curve/Complex interface</td>
<td>Jarmon et al., 2008; Luo et al., 2008; McKay et al., 2008; McVey, 2008; Sanchez, 2009; Schultzze et al., 2008.</td>
</tr>
<tr>
<td>Distraction and/or exposure to inappropriate content in-world</td>
<td>Chow et al., 2007; Luo et al., 2008; Hayes, 2006; McKay et al., 2008.</td>
</tr>
</tbody>
</table>

Student Acceptance of Second Life as an Educational Tool. Before any technology tool or teaching method can be successful, it must first be accepted as a viable educational tool or method by students. In some studies, students have expressed a reluctance to accept Second Life as an educational tool. In Lambert and Kidd (2008) researchers instructed a course in which the goal was to explore various educational technologies; graduate students indicated that they did not see the value in learning about Second Life. In Vogel et al. (2008), the HKNet project (a joint, distance education project between Hong Kong and the Netherlands) used a variety of
distance education tools to communicate and collaborate with each other. Using the Technology Acceptance Model (Davis, 1989) and Technology Acceptance Model 2 (Venkatesh & Morris, 2000), students indicated that out of all distance technology tools used (MSN, email, videoconferencing, online forums, and Second Life), Second Life was perceived as the least useful tool and the most difficult tool to use. Conversely, more traditional text-based communication approaches such as MSN messenger and email were considered the most useful and the easiest to use. In Jarmon et al. (2008), a team of graduate students used Second Life to complete a building project; however, 50% of students indicated that Second Life was not relevant to course content. In FitzGibbon et al. (2008), most student-teachers in Ireland had never entered a virtual environment, and one student said it was a “game” or “farce” (p.7).

**Technical Problems Related to Hardware and Software Requirements.** Linden Lab recommends that to run Second Life, a computer must have a cable or DSL Internet connection, a processor with 1.5 GHz, and at least 1 GB of memory. To run Second Life effectively, a computer must have a fast processor, a significant amount of RAM, a graphics card powerful enough to run the robust software (Chow, 2007; Sanchez, 2009; Schultze et al., 2008) and high Internet band-width (Vogel et al., 2008). Indeed, some schools may have computers too old to run the software, or their computers may lack the necessary memory or graphics card (Franklin et al., 2007; Luo et al., 2008). To save time for instruction, Second Life software must also be pre-installed (Chow, 2007), and the software require frequent updates (Luo et al., 2008). Second Life is also known to freeze up or crash (Vogel et al., 2008). Other technical problems include avatars appearing without clothes, and objects disappearing during building and editing (Sanchez, 2009).
Steep Learning Curve and Complex Interface. Due to Second Life’s complex interface and technical issues, the software maintains a steep learning curve (Sanchez, 2009). Learning to navigate in Second Life is a difficult task (Luo et al., 2008; McKay et al., 2008), and these navigational problems coupled with complicated communication tools may cause students to get separated from their classmates (McVey et al., 2008). Navigational issues could also lead to disorientation and confusion (Schultze et al., 2008). Jarmon et al. (2008) recommends that early training and acclimation to the virtual space be implemented to help students learn to use Second Life.

Distraction or Exposure to Inappropriate Content In-World. Because the Second Life environment is relatively unstructured (i.e., no goals or objectives to achieve, no quests on which to journey), the potential exists for students to get lost or distracted. Holding class in public space presents opportunities for disruptions or intrusions from random avatars not enrolled in the course (Chow et al., 2007; Luo et al., 2008); a private space may need to be created to prevent this possibility from occurring (Chow et al., 2007). In an open environment, it may take considerable time for the instructor to create a classroom atmosphere (McKay et al., 2008). Additionally, students could easily get distracted by avatar creation and Second Life activities not directly related to education (Luo et al., 2008). Students should also be aware that they could be exposed to porn or nudity any time they use the Second Life search feature and teleport to new islands (Hayes, 2006).

Undergraduate Pre-Service Teachers and Technology

Access to the Internet and computers is ubiquitous in American society. According to a study by the Pew Internet and American Life Project, 93% of adults age 18 to 29 have been on the Internet (Lenhart, Purcell, Smith, & Zickuhr, 2010). Undergraduate students use the Internet
for a variety of reasons: 94.6% visit the college or university’s website every week, 84.2%
download music and videos every week, and 70.4% use a course management system such as
Blackboard (Smith, Salaway, & Caruso, 2009). Students are also visiting and using social
networking sites such as Facebook and Myspace. Of adults age 18 to 29 who are online, 72% use
social networking sites, and 66% maintain a Myspace account and 71% maintain a Facebook
account (Lenhart et al, 2010). Among undergraduate students, 90.3% use social networking sites
on a daily basis (Smith et al., 2009). The difference between how often older and younger
undergraduate students use social networking sites is also changing. Among students age 18 and
19, 95.4% maintain a social networking site and 76% use them daily. Among students age 20 to
24, 94.7% maintain a social networking site and 62.9% use them daily (Smith et al., 2009).

Personal computer ownership is also ubiquitous; 66% of adults age 18 to 29 own laptop
computers as compared to 53% who own desktop computers (Lenhart et al., 2010).
Undergraduate student ownership of laptops increased while student ownership of desktop
computers decreased (Smith et al., 2009). Ownership of mobile digital devices is also increasing.
In the same age group, young adults on average own four out of seven gadgets (cell phones, mp3
players, ebook readers such as Amazon Kindle, gaming devices, and laptop and desktop
computers) (Lenhart et al, 2010). A full 93% of adults age 18 to 29 own a cell phone and 89.8%
of undergraduate students use text-messaging every day (Lenhart et al, 2010; Smith et al., 2009).

Such ubiquitous use of technology by students in their personal lives has led some
educators to believe that current pre-service teachers who have grown up with these technologies
will seamlessly integrate technology into their teaching. According to this line of thinking,
going into the classroom will no longer be an issue when digital natives become
pre-service teachers and then teachers (Prensky, 2001a, 2001b; Lei, 2009). It is assumed that
because mobile devices and social networking sites have changed the way they communicate and socialize that it has also changed the way they learn (DeDe, 2005).

However, since before the digital age began the opinion about teachers in connection with using technology has not been very positive (Lei, 2009). Teachers have been described as hesitant and reluctant (Eteokleous, 2008), and anxious (Harris & Grandgenet, 1996; Marcoulides, 1989). Additionally, it was suggested that even if barriers to using technology were removed, teachers would not automatically use technology (Ertmer, 1999). Reasons for pre-service teacher attitudes and beliefs about using technology have been suggested. One such reason is inadequate pre-service teacher technology training (Perkman, 2008). Teacher education programs have generally required students to complete only one educational technology course, but educators are beginning to realize that a more comprehensive approach is necessary if pre-service teachers are to acquire the requisite knowledge and skills needed to integrate technology into instruction (O’Bannon & Pluckett, 2007; Perkman, 2008). Additionally, teachers require sustained, adequate training and professional development (Dexter, Ronald, & Becker, 1999). Another suggested reason is connected to the personal learning and teaching style a teacher possesses, such as whether a teacher believes in constructivist or student-centered teaching principles. Those teachers who do use more constructivist instruction are more likely to integrate technology into their classroom instruction (Eteokleous, 2008).

Yet another reason posited is that pre-service teachers make distinctions between technologies they view as appropriate in their personal lives and professionally. Although current pre-service teachers use digital technologies such as cell phones, iPods, video games, and social networking sites on a daily basis in their personal lives, they do not necessarily believe they
should include them into their classroom instruction (Keren-Kolb, 2010). In an earlier study by Keren-Kolb and Fishman (2006), researchers found that out of 45 pre-service teachers surveyed, none of them had thought of including technologies they use everyday such as video games or instant messaging into their future classroom instruction. Clearly, there is a disconnect between what pre-service teachers may view as appropriate in their personal lives, and what they may view as appropriate in their professional lives.

Summary

The infusion of 21st century skills into education is an important step in preparing students to succeed in the digital age (Partnership for 21st Century Skills, 2009). These skills, however, are not new to educators; they should be a part of good teaching practice. Instead, “the challenge is to be more explicit in their inclusion in core content” (Thinkfinity, 2009, ¶3). Moreover, the potential of 21st century skills lies in exploring how digital tools as well as online resources can enhance and support traditional skills and teaching (Thinkfinity, 2009, ¶3). Virtual worlds are an example of a digital tool, or Web 2.0 tool, which has the potential to aid students practice using 21st century skills such as collaboration, communication, and creativity.

There are a few studies that focus on implementing a particular virtual world, Second Life, into college/university level courses. Some studies found that SL supports the skill of collaboration (Chow et al., 2007; Brown et al., 2008; Jarmon et al., 2008; Mayrath et al., 2007). Studies have also noted SL’s potential to foster creativity (Chow et al., 2007; Delwiche, 2006; Jarmon et al., 2008; Mayrath, et al., 2007; Sanchez, 2009). Results of the use of SL in college courses have not completely positive. Potential negatives noted by students and researchers were SL’s steep learning curve (Sanchez, 2009), technical difficulties derived from SL’s heavy hardware and software requirements (Chow et al., 2007; Jarmon et al., 2008; Sanchez, 2009), a
complex interface (Mayrath et al., 2007; Sanchez, 2009), a belief that the SL activity was not connected to course content (Delwich, 2006; Jarmon et al., 2008; Mayrath et al., 2007), spending time off task (Brown et al., 2008; Chow et al., 2007) and the impression that SL cannot be taken seriously as an educational tool (FitzGibbon, 2008; Lambert et al., 2008).

Few studies, however, focus on pre-service teachers as they learn how to navigate and use this Web 2.0 tool (Second Life). This research study attempts to understand the experiences of a group of pre-service teachers in a Technology in Education course (TE 260) as a virtual world (SL) is implemented into the course. As these pre-service teachers are also considered digital natives, the research study will also attempt to understand the level of knowledge and comfort the pre-service teachers have in using Web 2.0 tools.
CHAPTER III:

METHODOLOGY

Introduction

The purpose of the study was to gain an understanding of the experiences of undergraduate pre-service undergraduate teachers in a virtual world (Second Life) as the virtual world is introduced into a course. The study also allowed the researcher to gain an understanding of the undergraduate teacher candidates’ knowledge of 21st century skills and Web 2.0 tools both before and after they completed the course. The following research methodology was developed to address the central research questions and sub-questions described in Chapter I.

Research Questions

As previously mentioned in Chapter I, the central research question of this study was “Are undergraduate pre-service teachers who participate in a virtual Web 2.0 experience sufficiently prepared to function in a virtual world?” The following sub-questions were also explored

1) What are the perceived challenges/problems that undergraduate pre-service teachers face when using a virtual world (Second Life);

2) What are the perceived potential educational uses/benefits of a virtual environment (Second Life) in a technology course;

3) Do undergraduate pre-service teachers believe that the Second Life interventions have provided them the proficiency to operate in a virtual environment;
4) Do undergraduate pre-service teachers believe that Second Life (or other virtual worlds) is a viable educational tool/environment; and

5) How confident do undergraduate pre-service teachers feel about using virtual worlds and other digital technologies?

Study Participants and Sample

Participants for this study were pre-service teachers enrolled in two sections of Technology in Education (TE) 260 during Spring, 2010. Using purposeful sampling, the study sample of participants was obtained from this population. According to Wiersma and Jurs (2005), the “logic of purposeful sampling is based on a sample of information-rich cases that is studied in depth” (p. 312). Using this method, all participants are selected using prior identified criteria; all students are digital natives, are pre-service teachers, and are learning new Web 2.0 technologies including Second Life. While all students were required to complete the assignments associated with the study (because they were enrolled in the course), they were not required to participate in the study; students had the option to opt out of completing the two surveys as well as not having their journal entries included in the data collection and analysis.

Only students who were enrolled and present on the first day of class and who agreed to participate in the study by answering all three surveys were included in the study. Thus, out of a possible 43 students available, 38 students or 88% of the available students agreed to participate in the study. This particular group of students was selected using the identified criteria: all students were digital natives, were pre-service teachers, and were learning new Web 2.0 technologies including Second Life. The sample consisted of 32 (84%) females and 6 (16%) males. There were 19 lower division (freshman and sophomore) students, and 19 upper division (junior and senior) students. A total of 24 (63%) students were elementary education majors, six
(16%) students are special education majors, five (13%) students are physical education majors, and three (approximately 8%) students indicated other. A total 23 (60%) students are aged 19 to 20 years old, eight (21%) are aged 21 to 22 years old, three (approximately 8%) students are aged 23 to 24 years old, and four (approximately 11%) are aged 25 to 31 years of age.

Setting of the Study

Technology in Education (TE) 260 is open to all students across Large University. However, because TE 260 is the last TE course in the TE sequence, most students who enroll in the course are education majors, and all assignments in TE 201 and TE 260 are focused on the teaching of Web 2.0 tools and digital technologies in the context of teacher education.

Physical education major students are required to take both TE 201 and TE 260. Elementary education major students have the option of taking either foreign language courses, such as Spanish or French, or TE 201 and TE 260. Special education major students have the same option as elementary education students, but in practice, most special education students enroll in TE 201 and TE 260. Secondary education majors are not required to take either TE 201 or TE 260; it is the secondary education department’s responsibility to integrate TE 201 and TE 260 content into their core program courses.

TE 260 classes meet one night per week, every other week, or twice a month. During class meetings, students are introduced to new Web 2.0 tools and assignments. In TE 260, students learn about digital technologies such as Gmail, Google Docs, Twitter, Webs, Slideshare, and Second Life. Students learn how to use these technologies in the context of teacher education. For example, students learn to use Twitter by implementing it as a parent notification system. Students also learn about 21st century skills as created by the Partnership for 21st
Century Skills and adapted by ISTE. The course also has several overall objectives. These objectives are published in the syllabus and include the following:

1) Identify, evaluate, and implement Web 2.0 tools into classroom instruction and student assessment;

2) Recognize 21st century skills and plan instructional activities that incorporate current technology to address these 21st century skills;

3) Differentiate between project-based approaches and conventional instructional approaches;

4) Utilize a variety of Web 2.0 technologies and other online resources, and provide solutions for integrating Web 2.0 technology into classroom practices;

5) Utilize productivity and communication software to enhance learning, collaborate and publish projects with peers, and communicate with students, parents, and other concerned community members;

6) Utilize Web 2.0 tools as a platform for debating current issues in education;

7) Develop a curriculum project-based unit plan portfolio that is standards-based, framed around related curriculum-framing questions, and incorporates authentic assessment techniques that gauge, encourage, and demonstrate student learning and understanding; and

8) Identify instructional accommodations to meet the needs of all students including special needs as well as gifted and talented.

The National Education Technology Standards (NETS) created by the International Society for Technology in Education (ISTE) are also incorporated into the course. The NETS include the following:
1) Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments (NETS 1);
2) Design and Develop Digital-Age Learning Experiences and Assessments (NETS 2);
3) Model Digital-Age Work and Learning (NETS 3);
4) Promote and Model Digital Citizenship and Responsibility (NETS 4); and
5) Evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning (NETS 5C).

Study Design

The researcher used the concurrent triangulation mixed method research approach to collect and analyze both quantitative and qualitative data for the study. The concurrent triangulation method gives equal emphasis to both quantitative and qualitative data, and combines them in the interpretation phase, which promotes data triangulation (Creswell et al., 2008). Using a mixed method approach allows several issues to be simultaneously invested (Wiersma & Jurs, 2005). There are several advantages to using a mixed method research approach, such as avoiding a possible unimethod bias, appealing to different audiences (i.e., audiences of qualitative and quantitative research, respectively), providing a variety of perspectives, and allowing for the ability to address multiple questions (Wiersma & Jurs, 2005). Mixed method research is also implemented to better understand the other approach or to build results from the other approach (Creswell, 2009). This study sought to explore the experiences of pre-service teachers in two sections of an undergraduate course, TE 260, during the implementation of a virtual world (Second Life) into a course. The study also investigated the
experiences, including levels of comfort and confidence, of pre-service teachers as they learned how to use various Web 2.0 tools during a course, TE 260. There were five parts to the study. A brief overview of each part is provided below.

**Role of the Instructor and Proctor**

Instructor’s Role. To satisfy Internal Review Board (IRB) compliance and to protect the anonymity of the participants, the study was divided into two distinct roles: a) TE 260 course instructor and b) proctor. The roles were carried out by two individuals. The TE 260 course instructor served only as the instructor of the course. The instructor was responsible for teaching the Second Life interventions (Second Life Activities) in Part II. As a result, the instructor did not see or review any study data or information obtained by surveys, focus group sessions, and Second Life LiveJournal entries until the course was completed, and all student grades were finalized and reported to Large University. Therefore, the instructor had no knowledge of who participated in the study and did not actively begin analyzing the data until the TE 260 course had concluded and all student grades had been reported to Large University.

The instructor taught students in TE 260, carried out the day to day activities of the course, and deployed the Second Life intervention activities in Part II. Since the spring semester of 2007, the instructor has maintained a presence inside Second Life (SL). The instructor is also a member of the International Society of Technology in Education (ISTE) group inside SL. Since September 2008, the instructor has been a member of a cross-campus group of educators and researchers at Large University that meet once a month to discuss their research and activity taking place in SL; the group includes members from the College of Education, Arts & Sciences, and the Faculty Resource Center. The instructor is also a subscriber to the Second Life Educators Listserv (SLED) and the Educatorsandteens listserv. The instructor was the instructor of record
for TE 201 from summer term 2008 through summer term 2009. TE 201 immediately precedes TE 260; beginning in the fall 2009 semester the instructor was moved from TE 201 to TE 260. In TE 260, the instructor taught pre-service teachers how to use various Web 2.0 technologies within educational contexts (i.e. designing a newsletter, conducting a parent-teacher conference, etc.). The instructor also implemented the Web 2.0 tool Second Life into the curriculum, and was responsible for evaluating student work completed in Part II (Activities 1 through 4) based upon assessment checklists designed for each assignment and informal observations. These checklists and informal observations were not included in data collection and analysis. Finally, all parts of the study were designed by the instructor.

**Proctor’s Role.** In this study, a separate individual (a proctor) actively carried out the apparatus of the study in order to protect the anonymity of the respondents/participants. This individual explained the study, recruited participants, obtained consent forms, proctored the surveys, served as the focus group guide, transcribed audio recorded focus group data, and personally managed and stored all data collected throughout the study. Any student questions directly related to the study were directed to the proctor. The proctor conducted all data collection aspects of the study in Parts I through V.

The proctor delivered and administered the informed consent form to all potential participants, thus explaining the study and recruiting potential participants. The proctor administered, proctored, and collected all surveys (Parts I, III, and IV). The proctor facilitated and guided the two focus group sessions (Part V), audio taped the sessions, transcribed the sessions, and stored the transcriptions and recording in a secure location. All data connected to the study were collected and stored in a secure location by the proctor until the TE 260 course
concluded and the instructor reported all student grades to the Large University. After all grades were reported, the instructor obtained all data from the proctor and analyzed the data.

**Part I: Technology Use Pre-Survey**

Part I collected quantitative data from a pre-survey (Technology Use Pre-Survey) and was administered entirely by the proctor. In Part I, the proctor recruited participants from TE 260 for the study, delivered the informed consent form, explained the study, and proctored the pre-survey. The proctor collected all completed pre-surveys and secured them in a locked cabinet in the proctor’s apartment for the duration of the course, until all student grades were reported to Large University. This pre-survey, and all other parts of the study, were anonymous (the instructor never knew who participated in the study).

**Part II: Scaffolded Second Life Activities**

**Part A.** Part II was comprised of 4 in-class (TE 260) Second Life intervention activities led by the instructor. The instructor taught students how to use Second Life, and assessed the activities because they were normal parts of the course, by using checklists and observations. The instructor observations and checklists were not included in the data collection, and were strictly part of the regular, day-to-day operations of the course.

**Part B.** Part II also collected qualitative data from LiveJournal entries with permission from students obtained in the informed consent form in Part I. These entries were collected by the proctor at the end of the course after student grades were reported to Large University. Throughout the course, students were required to write reflections about their assignments in LiveJournal (http://www.livejournal.com). LiveJournal entries related to Second Life Activities were not viewed by the instructor, and were not assessed by the instructor. The LiveJournal entries were collected and viewed only by the proctor. At the end of the course, the proctor
collected LiveJournal entries by visiting each participant’s LiveJournal account, and then copying and pasting the entries into a Microsoft Word document. Once the course concluded the entries were emailed to the instructor. At no point, either during or after the course, did the instructor know the identities of students who entered their entries into the study.

Part III: Virtual World Experiences Survey

Part III collected quantitative data from the Virtual World Experiences survey and was administered entirely by the proctor. The instructor was not present. The proctor answered any questions directly about the survey/study. The proctor collected all of the completed Virtual World Experiences surveys and secured them in a locked cabinet in the proctor’s apartment for the duration of the course, until all student grades had been reported to Large University.

Part IV: Technology Use Post-Survey

Part IV collected quantitative data from a post-survey (Technology Use Post-Survey) and was administered entirely by the proctor. The instructor was not present. The proctor answered any questions directly about the post-survey/study. The proctor collected all of the completed post-surveys and secured them in a locked cabinet in the proctor’s apartment for the duration of the course, until all student grades were reported to Large University.

Part V: Second Life Experiences Focus Group

Part V collected qualitative data from two focus group sessions, one session per section of TE 260. The proctor selected, at random, five students from each section of TE 260 (2 sections) to conduct one focus group session for each section. Students indicated in the informed consent form in Part I whether they were interested in being a potential discussant in the focus group, but they had the option to drop out even if they were selected. The proctor facilitated the focus group sessions, and taped them with a digital recorder. The proctor transcribed the
recordings on the proctor’s home computer. Once the study was concluded and grades were reported to Large University, all transcriptions and data recordings were destroyed. During the study, the transcriptions were stored on the proctor’s password protected computer in the proctor’s apartment, and the digital recordings were securely stored in a locked cabinet in the proctor’s apartment.

Ethical Considerations

Any study with human participants must address ethical considerations. Participation in the study was voluntary. A list of steps taken to address these considerations is provided below.

1) An IRB to conduct the study and collect the data was completed and submitted to Large University’s Institutional Review Board. The review board approved the study.

2) To protect the anonymity of students enrolled in TE 260, two distinct, separate roles were created: a) TE 260 course instructor, and b) proctor. The TE 260 course instructor served only as the instructor of the course. The TE 260 course instructor was responsible for teaching the Second Life interventions (Second Life Activities) in Part II. As a result, the instructor did not see or review any study data or information obtained by surveys, focus group sessions, and Second Life LiveJournal entries until the course was completed, and all student grades were finalized and reported to Large University. The proctor, a separate individual, explained the study, recruited participants, obtained consent forms, proctored the surveys, served as the focus group guide, transcribed audio recorded focus group data, and personally managed and stored all data collected throughout the study. Any student questions directly related to the study were directed to the proctor. The researcher conducted all data collection aspects of the study in Parts I through V.
3) A signed letter of consent form was obtained from each participant. The form included the study’s purpose and a description of the data collection methods. (See Appendix A)

4) All participants were provided the opportunity to ask the researcher questions before and during the study.

5) All participants were given the option to opt out of the study at any time during the semester.

6) All participants were assured that they would remain anonymous; their identities would not be included in the study nor provided to any outside observer. The researcher randomly assigned numbers for students at the beginning of the course so as to compare pre-survey results with post-survey results.

Instrumentation Reliability and Validity

This study examined pre-service teachers’ experiences in Second Life. Three survey instruments were developed: a pre-survey (Technology Use Survey), a Virtual World Experiences survey, and a post-survey (Technology Use Survey). The pre-survey was administered on the first day of class in TE 260. The Virtual World Experiences survey was administered after students completed all four Second Life intervention activities. The post-survey (Technology Use Survey) was administered at the end of the course, and prior to the focus group session.

The pre-survey and post-survey were adapted from the Technology Use Survey by Jing Lei (2009), and are identical to each other. A request was made to Lei to adapt the survey, and permission was granted (see Appendix B). Lei (2009) studied pre-service teachers as digital natives, and focused on identifying the need for teacher preparation. Lei’s survey was initially
pilot tested with three pre-service teachers enrolled in the same college of education; based upon feedback from the participants, a revised instrument was administered to 70 students with 55 valid, usable responses (Lei, 2009). In section one, Lei asked students questions regarding how much time students spent on computers and what they did when they were on the Internet. In section two, Lei provided students with a series of statements about comfort and confidence in using technology and asked students to rate each statement on a scale from one to five (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree). In section three, Lei asked students to rate their own perceived level of proficiency in using a series of 51 different technology tools. To establish content validity of section three regarding the difficulty level of the different digital technologies, Lei asked a panel of experts to rate each technology independently on a scale of one to three, with one meaning “basic,” two meaning “intermediate,” and three meaning “advanced.” The panel consisted of two educational technology faculty members and two technology support staff members in the teacher education program (Lei, 2009). After independently rating the technologies, an average rating for each technology was obtained to group technologies into four levels of difficulty (Lei, 2009). The categories were basic technologies rated 1 to 1.25, lower intermediate technologies rated 1.5 to 1.75, upper intermediate technologies rated 2 to 2.25, and advanced technologies rated 2.5 to 3.

The original adapted pre-survey and post-survey used in this study consisted of 47 questions and seven questions about demographic information, including gender, age, major, education status (freshman, sophomore, etc.), time spent on computers, age at which the participant began to use the computer, and information about how students most use the Internet. Sections one and two consisted of Likert-type questions on a scale from one to five. Section one includes 18 questions related to student comfort and confidence in using technology on a scale
from one to five (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree). An example of this type of question is “I am confident in using technology in my learning.” Section two included 29 questions related to student skill proficiency in using Web 2.0 tools, including tools used in TE 201 and TE 260 on a scale from one to five (No Experience, Beginner, Moderate, Substantial, Expert). An example of this type of question is “Rate your skill proficiency in blogging.”

To establish the validity of the pre-survey and post-survey, a panel of experts rated the instrument. According to Gregory (2007), “content validity is generally determined by having experts in a given content area rate the degree to which the items represent the content or concept intended” (Houser, 2009, p. 171). Therefore, a panel was selected to rate the pre-survey/post-survey, consisting of an instructional technology faculty member, an instructional technology specialist, and a faculty member who has taught TE 100, TE 201, and TE 260 previously. The panel rated each question with answers of 1 = Not at All, 2 = Possibly Represents Content/Concept, and 3 = Definitely Represents Content/Concept. According to Polit, Beck, and Owen (2007), Lynn (1986) says that when there are fewer than five experts a scale’s item content validity index (I-CVI) must be equal to 1.00; all experts must agree that an item is valid. Therefore, 8 items were dropped from the 47-item survey to create a 39-item survey. The following calculations were performed to further establish reliability and validity and are reported in Chapter IV: Cronbach alpha for reliability, item-to-total correlations for reliability, and factor analysis for validity.

The third survey instrument (Virtual World Experiences survey) consisted of six questions which asked for demographic information, including gender, age, major, education status (Freshman, Sophomore, etc.), time spent on computers, age at which the participant began
to use the computer, two Yes/No questions, and 41 questions concerning student experiences of
the Second Life intervention activities. The 41 questions were Likert-type questions rated from
one to five (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree). An example of an
item is “It was easy to move (to walk, to run, etc.) my avatar inside the virtual world.” Survey
items were based upon the review of related literature and the Second Life assignments newly
implemented into the course. To establish the validity of the Virtual World Experiences survey, a
panel of five experts was selected to rate the instrument. The panel consisted of faculty members
of educational studies in psychology, research, and counseling who were experienced with
Second Life, an instructional technology specialist, and a Ph.D. with extensive experience with
Second Life. The panel rated each question with answers of $1 = \text{Not at All}, 2 = \text{Possibly Represents Content/Concept}$, and $3 = \text{Definitely Represents Content/Concept}$. According to Polit, Beck, and Owen (2007), scale level content validity index (S-CVI) can be calculated by
first calculating each item’s content validity index (I-CVI) and then computing the average. All
items below an I-CVI of .80 were dropped, and further, any item with a rating of “1” was also
dropped, leaving an instrument of 32 items with an S-CVI of .89. The following calculations
were performed to further establish reliability and validity and are reported in Chapter IV:
Cronbach alpha for reliability, item-to-total correlations for reliability, and factor analysis for
validity.

Data Collection Procedures

Two separate individuals conducted two roles during the study: the TE 260 course
instructor and the proctor. The TE 260 course instructor taught the course and assessed student
work. The proctor conducted the study and collected and stored all data related to the study. The
two roles did not overlap at any point. The TE 260 course instructor did not view or analyze the
collected data until all student grades had been reported at the end of the course. Student anonymity was maintained throughout, as the TE 260 instructor did not, at any point, know who was participating in the study. The study consists of five parts. Each of the five parts is described below.

*Part I: Technology Use Pre-Survey*

This study focused on digital natives as pre-service teachers as they learned how to use and implement the tool Second Life. Since the focus of TE 260 was to teach pre-service teachers how to use and implement various Web 2.0 technologies, two sections of TE 260 were identified as possessing potential participants for the study. In TE 260 students learned how to use several digital technologies such as Wikis, LiveJournal, and Twitter. LiveJournal (http://www.livejournal.com) was an important component to the course; it is a free, online (Internet) diary (similar to a blog) which students learned to use in the course by writing reflective journal entries related to their assignments.

The pre-survey was administered by the proctor during one TE 260 class period at the beginning of the Spring 2010 semester. The instructor was not present. The proctor explained the study to all students, and handed out an informed consent form (see Appendix A). The proctor read the consent form aloud with the students. Students who decided to be part of the study signed the consent form. Students who signed the consent form indicated that they would like to complete the three surveys administered during the study, and would be willing to be included in the random student drawing for the focus group sessions. At the end of the pre-survey, students were also given the opportunity to have their LiveJournal entries included in the study. Students who signed the consent form were then given the pre-survey to complete during the session. The proctor collected the completed pre-surveys and secured them in the proctor’s
apartment for the duration of the study until the TE 260 course had officially concluded and all student grades had been reported. At the conclusion of the study, pre-surveys were destroyed.

**Part II: Scaffolded Second Life Learning Activities**

Part II had two distinct and separate parts: a) the Second Life activities led by the TE 260 instructor (Instructor’s Role), and b) qualitative data from LiveJournal entries related to student experiences about the Second Life activities which were collected and secured by the proctor (Proctor’s Role). The two roles did not overlap. In each activity, the instructor taught students about Second Life within the normal confines of the course (TE 260) and assessed students using checklists and observations; information gathered from checklists (see Appendix D-F) and observations are not included in data collection for the study. After each activity, students were required to post reflections related to their experiences in completing the Second Life intervention activities in their LiveJournal; these reflections were collected by the proctor at the end of the course and are included in qualitative data collection for the study. Throughout the course, students wrote reflections about their assignments in LiveJournal (http://www.livejournal.com). LiveJournal entries related to their Second Life intervention activities were not viewed by the instructor, and were not assessed by the instructor. The LiveJournal entries were collected and viewed only by the proctor. The proctor visited the LiveJournal accounts of students who agreed in Part I to enter their LiveJournal entries into the study, and copied and pasted all entries into a Word document. The proctor secured the LiveJournal entries on a password-protected computer in the proctor’s apartment until the course had concluded and all grades had been reported to Large University. At no point, either during or after the course, did the instructor know the identities of students who entered their LiveJournal entries into the study.
In Part II, students completed a set of intervention activities in Second Life. Based upon recommendations from previous studies (Delwiche, 2006; Mayrath et al., 2007), a series of activities were created to scaffold student learning as they learned how to use Second Life. The activities were created to help students acclimate and adjust to operating inside SL with the intent to slowly build student confidence and skill inside Second Life. These activities were designed to take place over the course of the semester during the TE 260 course. Prior to these activities, students had not been taught how to use Second Life. It was hoped that after the intervention of the activities, students would know how to use Second Life, and would be comfortable and confident in using Second Life. All four activities were facilitated by the instructor. The proctor collected qualitative data from LiveJournal entries, which the instructor did not see until all grades had been reported at the end of the semester. The series of intervention activities are described in Part II below.

Activity One: Introduction to Second Life, Instructor’s Role. In Activity One, the instructor introduced Second Life to each section of TE 260 during one class period at the beginning of the semester in Computer Lab 3. In Computer Lab 3, Second Life software was already pre-loaded on each computer. During this session, the instructor introduced the students to Second Life by showing them the SL website (http://www.secondlife.com) as well as video clips about SL stored at YouTube (http://www.youtube.com). Next, the instructor led students through the process of creating their own Second Life account (free at no cost to the student) and then creating their initial avatar (also free at no cost to the student). During this time, the instructor addressed any questions or problems the students encountered. Finally, students were asked to complete Orientation Island inside Second Life. When a user first establishes an account and enters Second Life, the user (their avatar) is automatically transported to an island called
Help Island; the island is designed to help new users learn how to operate inside the virtual environment. During this session, the instructor made only informal in-class observations during Activity One to ensure students understood material.

**Activity One: Introduction to Second Life, Proctor’s Role.** After completing Activity One, students were required to post an entry to their LiveJournal account. On their LiveJournal account students answered the following prompt: a) Describe your initial thoughts about Second Life; b) Do you think Second Life has potential as an educational tool? Please explain; c) What are your initial impressions of Second Life?”

**Activity Two: Series of Task, Instructor’s Role.** In Activity Two, students were required to complete an assignment in which they practiced moving around and completing simple tasks inside Second Life. In Hearrington (2009), students were required to complete what the researcher called a “Maze Task” whereby students were required to perform specific tasks such as navigating through a door, flying and landing in a specific place, taking a picture of their avatar and emailing it to the professor, answering a question on a note card, and teleporting to another location in Second Life. Therefore, the instructor in this study designed a series of tasks similar to Hearrington (2009). The tasks are described below:

1) Students were provided with the address to Large University’s College of Education Island inside Second Life, and were required to go the island.

2) On the island, students located Education Hall 1 and took a picture of their avatar in front of Education Hall 1. Then they emailed the picture to their instructor inside SL.

3) Next, students located the Large Clock Tower on the island. Students were required to take a picture of their avatar flying in front of the Large Clock Tower, and then email the picture to their instructor.
4) Students were then required to leave the island and locate the Large University’s Arts and Sciences Island. On the island they were required to locate the avatar of the Large University’s mascot, take a picture of their avatar with the mascot avatar, and email the picture to their instructor.

5) Students were then required to locate and acquire free clothing or free items for their avatar. They were required to take a picture of their avatar with the new items and to then email the picture to the instructor.

A checklist was used by the instructor to determine if students achieved the objectives (see Appendix D) in Activity Two. Steps 1 through 3 were designed to help students learn to walk and fly inside SL, to practice locating buildings and landmarks inside SL, and to use SL’s email function. Step 4 required students to actively search SL for clothes or items either independently or collaboratively with other classmates. Therefore, the potential existed to address the following 21st century skills: working independently, accessing information, collaboration, and communication.

**Activity Two: Series of Task, Proctor’s Role.** After completing Activity Two, students were again required to post an entry to their LiveJournal account which asked them to respond to this prompt: a) Describe your experience in locating the various locations, in taking pictures, and in emailing the instructor; b) Did you find the locations and free items on your own, or did you complete it with a classmate or someone else; and c) Did you have any problems/frustrations/successes? Please describe.

**Activity Three: Parent-Teacher Virtual Conference, Instructor’s Role.** In Activity Three students were required to role-play a parent-teacher conference inside Second Life. Role-play inside Second Life has been tried in previous studies with positive results (Gao et al., 2008;
Mayrath et al., 2008); both studies indicated that role-play activities in SL are equally effective as role-play activities in the real world. Findings by Yee et al. (2007) that interactions in Second Life are governed by the same social norms in the real world also support the potential of role-play in SL.

To role-play the parent-teacher conference, the activity occurred in a classroom inside Education Hall 1 at the Large University’s College of Education Island. For this activity, students were divided into groups of two. One student played the role of the teacher, while the other student played the role of the parent. Both students were given the opportunity to role-play as both teacher and parent. Students were given their roles three weeks before the activity began so as to give them time to prepare. The instructor was present in the role of observer and to assist if students had any problems during the role-play activity. Students were also required to dress their avatar appropriately for the role-play activity. A checklist was used by the instructor to assess the activity (see Appendix E). The role-play activity also addressed the following 21st century skills: communication, collaboration, creativity, adapting to change, and flexibility.

Activity Three: Parent-Teacher Virtual Conference, Proctor’s Role. After students completed Activity Three, students responded to the following prompt in their LiveJournal account: a) Reflect on your experience participating in the role-play activity; b) Was it a positive/negative experience? Please explain; c) Did you have any problems with Second Life; d) How would you compare it to face-to-face role-play activity; e) Do you think a virtual world could be a potential place to hold parent/teacher conferences; and f) Do you feel like you were prepared for the activity?

Activity Four: Group Building Project, Instructor’s Role. In Activity Four, students collaborated in groups to create a work of art or a series of objects inside Second Life. Students
had the option to build or create anything in SL, as long as it was related to the course or to education. The primary goal of the activity was to provide students with the opportunity to practice using SL to create something from the bottom-up (i.e., by the students), which is the hallmark of Web 2.0. Before students completed the activity, instructional time was spent between the instructor and students inside Second Life learning how to use Second Life’s building tools. After this practice session, students were divided into groups of 4 to 5 students and asked to return to Large University’s College of Education Island. On the island, each group located the sandbox (an area designed for any person in Second Life to build objects for free). In the sandbox, each group worked together to create a work of art or object. Each group was required to take a picture of their creation and to email it to the instructor. Each group presented their work of art to the class. Students were also given the chance to vote for their favorite piece. A checklist was used by the instructor to determine if students completed the activity (see Appendix F) in Activity 4. The activity also was designed to address the following 21st century skills: collaboration, communication, creativity, problem-solving, media literacy, flexibility and adaptability, and leadership.

Activity Four: Group Building Project, Proctor’s Role. After completing Activity Four, students replied to the following prompt in their LiveJournal: “Reflect on your experience participating in the group building activity. Consider the following questions: a) Did this activity help you become more comfortable with Second Life; b) Describe your experience working a group in Second Life; c) Did your group meet in person, or over distance in Second Life to complete the project; d) Do you think this activity was relevant to the course; e) Do you think future students should learn about Second Life; and f) Do you feel that you are now prepared to
use Second Life and/or potentially other virtual worlds, either in your free time or potentially in an educational context?"

**Part III. Virtual World Experiences Survey**

Part III was conducted entirely by the proctor. In Part III, the Virtual World Experiences survey (see Appendix G) was administered at the end of the course during a regularly scheduled class period in the regular TE 260 classroom (Computer Lab 3) and was handled solely by the proctor. The instructor was not present. This survey instrument consisted of eight demographic questions, including two yes/no questions, and 32 questions asking students about their experiences during the Virtual World Experiences Activities (Part II). The 32 survey questions were asked students about their comfort and confidence in using Second Life and 21st century skills. The proctor collected the completed surveys and secured them in the proctor’s apartment for the duration of the study until the TE 260 course has officially concluded and grades were reported to Large University. At the conclusion of the study, the Second Life surveys were destroyed.

**Part IV: Technology Use Post Survey**

Part IV was conducted entirely by the proctor. The instrument used in Part IV was identical to the adapted survey instrument used in Part I (see Appendix H). The instrument was administered at the end of the course in the regularly scheduled classroom of TE 260 (Computer Lab 3). As with Part I, the instructor was not present during the proctoring of the survey. The proctor administered the survey, answered any questions from students about the survey, and collected the completed surveys. The proctor stored the completed surveys in the proctor’s apartment in a securely locked location.
Part V: Focus Group Sessions

Part V was conducted entirely by the proctor. Two focus group sessions, one for each section of TE 260, was held at the end of the course during a scheduled class period in the regular classroom (Computer Lab 3); this time was selected because it was thought that choosing a time during a normal class time would be most convenient for students. According to Morgan (1988), focus groups should have as few as three or four participants and no more than twelve. Therefore, the aim was to have between five and seven participants; the researcher selected five students at random in each section. Only students who indicated in Part I that they would be willing to be selected for the focus group sessions were included in the selection process. Students who were randomly selected were emailed by the proctor and asked if they would mind participating in the focus group. Students could opt out of participating in the focus group; students who were not interested in participating simply had to email a reply to the proctor indicating that they did not wish to participate. A focus group guide was also developed (see Appendix I). The focus group sessions were taped using a digital voice recorder and were transcribed by the proctor. To protect the anonymity of the participants, each participant was given a number in the transcription. The tapes and the transcriptions were secured in the proctor’s apartment. Once the digital recordings were transcribed, the recordings were deleted. After the study concluded, the digital transcriptions stored on the researcher’s computer were destroyed.

Throughout the study it was made clear to students that they did not have to participate. Students could opt out of participating in the study at any time during the study; and this was made clear at the beginning of the study, during the study, and after the study. It was also made
clear that non-participation in the study had absolutely no impact on their grade in the course, since the instructor had no knowledge regarding who actively participated in the study.

Data Analysis Procedures

SPSS 17.0 was the main statistics package used for data analysis for quantitative data gathered from the two survey instruments; Microsoft Excel was also used. Likert-type items are reported using descriptive statistics. Cronbach alpha and item-to-total correlations were calculated. Qualitative data obtained from LiveJournal entries and focus group transcripts were analyzed using a constant comparative approach (Lincoln & Guba, 1985). Focus group sessions were audio-taped, and were available only to the researcher. Numbers were assigned to each focus group participant. Sessions were transcribed on the researcher’s computer, and then printed and analyzed. Once data were transcribed the tapes were destroyed.

The focus group transcripts and LiveJournal entries were repeatedly read and re-read to discover, inductively, any categories, emergent themes, and passages to establish themes and codes (Corbin & Strauss, 2007). The researcher then re-read through the sources again, and holistically viewed data, reading for trends, patterns, categories, themes, commonalities, or divergences. Any themes, categories, or trends were noted. Data from qualitative sources were used to explain or further inform data obtained from quantitative sources.

Summary

The purpose of the study was to gain an understanding of the experiences of undergraduate pre-service teachers in a virtual world (Second Life) as the virtual world is introduced into a course. Another purpose was to understand the experiences of pre-service teachers as a virtual world, Second Life, is implemented into a college course. Chapter III provided an outline of the research methodology used in the study, including a description of the
participants, the setting, and the statistical procedures followed. Results of the analysis are presented in Chapter IV.
CHAPTER IV:

RESULTS

The purpose of this study was to gain an understanding of the experiences of undergraduate pre-service teachers in a virtual world (Second Life) as the virtual world is introduced into a course. This chapter describes the statistical analysis of the Technology Use Pre-Survey, the Virtual World Experiences Survey, the Technology Use Post-Survey, the LiveJournal student reflection entries, and the focus group sessions. As previously mentioned in Chapter I, the central research question of this study was “Are undergraduate pre-service teachers who participate in a virtual Web 2.0 experience sufficiently prepared to function in a virtual world?” The following sub-questions were also explored:

1) What are the perceived challenges/problems that undergraduate pre-service teachers face when using a virtual world (Second Life)?

2) What are the perceived potential educational uses/benefits of a virtual environment (Second Life) in a technology course?

3) Do undergraduate pre-service teachers believe that the Second Life interventions have provided them the proficiency to operate in a virtual environment?

4) Do undergraduate pre-service teachers believe that Second Life (or other virtual worlds) is a viable educational tool/environment?

5) How confident do undergraduate pre-service teachers feel about using virtual worlds and other digital technologies?
The Pre-Survey and Post-Survey (Technology Use Survey) were identical, and both contained two distinct Likert-type scales. The first scale for both surveys is a six-answer Likert-type scale with answers of “Strongly Disagree,” “Disagree,” “Somewhat Disagree,” “Somewhat Agree,” “Agree,” and “Strongly Agree” and is also referred to as Pre-Survey One (and Post-Survey One). The second scale for both surveys is a five-answer Likert-type scale with answers “No Experience,” “Beginner,” “Moderate Experience,” “Substantial Experience,” and “Expert” and is referred to as Pre-Survey Two (and Post-Survey Two). The Virtual World Experiences survey used a 5-answer Likert-type scale with answers of “Strongly Disagree,” “Disagree,” “Neutral,” “Agree,” and “Strongly Agree.” Seven questions on the survey used a reverse scale. Table 4 displays the connection between the research questions and the data collection instruments.
Table 4

**Research Questions and Corresponding Data Collection Instruments**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Data Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) What are the perceived challenges/problems that undergraduate pre-service teachers face when using a virtual world (Second Life)?</td>
<td>Virtual World Experiences survey, Technology Use Pre-Survey, Technology Use Post-Survey, LiveJournal entries, and focus group sessions</td>
</tr>
<tr>
<td>2) What are the perceived potential educational uses/benefits of a virtual environment (Second Life) in a technology course?</td>
<td>Virtual World Experiences Survey, LiveJournal Entries, and focus group sessions</td>
</tr>
<tr>
<td>3) Do undergraduate pre-service teachers believe that the Second Life interventions have provided them the proficiency to operate in a virtual environment?</td>
<td>Virtual World Experiences Survey, LiveJournal Entries, and focus group sessions</td>
</tr>
<tr>
<td>4) Do undergraduate pre-service teachers believe that Second Life is a viable educational tool/environment?</td>
<td>LiveJournal Entries and focus group sessions</td>
</tr>
<tr>
<td>5) How confident do undergraduate pre-service teachers feel about implementing virtual worlds and other digital technologies into classroom instruction?</td>
<td>Virtual World Experiences survey, Technology Use Pre-Survey, Technology Use Post-Survey, LiveJournal entries, and focus group sessions</td>
</tr>
</tbody>
</table>

Descriptive Context for Research Questions

In this section descriptive information taken from the Technology Use Pre-Survey and the Virtual World Experiences Survey are provided. These statistics will help guide and inform the study. Thirty-two (84%) females and six (16%) males participated in the study (see Table 5).
Table 5

Participants by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Students</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>32</td>
<td>84.2%</td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
<td>15.8%</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>100%</td>
</tr>
</tbody>
</table>

Half of the respondents, 19 were upper division students (junior and senior classification), with the other half being 19 lower division students (freshman and sophomore classification). See Table 6.

Table 6

Academic Classification (Upper and Lower)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Students</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Division</td>
<td>19</td>
<td>50%</td>
</tr>
<tr>
<td>Upper Division</td>
<td>19</td>
<td>50%</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>100%</td>
</tr>
</tbody>
</table>

A total of 23 (61%) students were age 19 to 20 years and 15 (39%) students were age 21 to 31 years. See Table 7.

Table 7

Participants by Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Students</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 to 20</td>
<td>23</td>
<td>60.5%</td>
</tr>
<tr>
<td>21 to 31</td>
<td>15</td>
<td>39.5%</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>100%</td>
</tr>
</tbody>
</table>
In the Technology Use Pre-Survey (hereafter Pre-Survey), students were asked when they first started using computers. Eighteen (47.4%) students indicated they had started using computers sometime before Kindergarten to third grade, 16 (42.1%) students said that they started using computers in grades four or five, and 4 (10.5%) students said they started using computers in grade six or later (see Table 8).

Table 8

*Computer Start Time (n = 38)*

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Students</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-K to Grade 3</td>
<td>18</td>
<td>47.4%</td>
</tr>
<tr>
<td>Grades 4 and 5</td>
<td>16</td>
<td>42.1%</td>
</tr>
<tr>
<td>6th Grade or Late</td>
<td>4</td>
<td>10.5%</td>
</tr>
</tbody>
</table>

In the Pre-Survey, students were also asked how much time they spent each day on the computer. As shown in Table 9, eleven (28.9%) students answered one to two hours each day on a computer, thirteen (34.2%) indicated two to three hours each day on a computer, ten (26.3%) students spent three to four hours each day on a computer, and four (10.5%) answered more than four hours each day on a computer.

Table 9

*Time Daily Spent on a Computer (n = 38)*

<table>
<thead>
<tr>
<th>Hours</th>
<th>Number of Students</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 2 hours</td>
<td>11</td>
<td>28.9%</td>
</tr>
<tr>
<td>2 to 3 hours</td>
<td>13</td>
<td>34.2%</td>
</tr>
<tr>
<td>3 to 4 hours</td>
<td>10</td>
<td>26.3%</td>
</tr>
<tr>
<td>More than 4 hours</td>
<td>4</td>
<td>10.5%</td>
</tr>
</tbody>
</table>
In the PresSurvey, students were asked to identify, from a list of several options, the top five reasons they use the Internet. Spending time on social networking sites such as Facebook or Myspace received the most number one votes with seventeen (44.70 %), and approximately 87% of students listed social networking in their top five choices. Using the Internet to complete course/class assignments received the second highest number of number one votes with eleven (28.90%), but this option received, overall, the highest number of top five votes with 92.11 % of students placing it in their top five. The third choice, email, received four (10.5%) number one votes. The top seven choices can be seen in Table 10.

Table 10

*Top Five Reasons Students Use the Internet*

<table>
<thead>
<tr>
<th>Reasons</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Networking (Facebook, Myspace, etc.)</td>
<td>17</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>86.84%</td>
</tr>
<tr>
<td></td>
<td>(44.7%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working on course/class assignments</td>
<td>11</td>
<td>12</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>92.11%</td>
</tr>
<tr>
<td></td>
<td>(28.94%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td>4</td>
<td>11</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>78.95%</td>
</tr>
<tr>
<td></td>
<td>(10.5%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Downloading pictures, music, movies, etc.</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>50.00%</td>
</tr>
<tr>
<td>Surfing the Net for fun</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>47.37%</td>
</tr>
<tr>
<td>Searching Internet for practical purposes</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>36.84%</td>
</tr>
<tr>
<td>(health, weather, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading news to know what’s going on.</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>34.21%</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>100%</td>
</tr>
</tbody>
</table>

In the Virtual World Experiences survey, students were asked if they had ever heard of Second Life before taking the TE 260 course. Only 11 (28.9 %) students had heard of Second Life before the course began, with 27 (71.1 %) having never heard of it.
Students were also asked, in the Virtual World Experiences survey, if they had ever used Second Life. All 38 students indicated that they had never used Second Life before taking TE 260.

In the Pre-Survey and Post-Survey, students were asked a set of questions about their level of comfort and confidence in using technology. Questions and responses can be seen in Table 11. Student comfort and confidence in using technology remained high, both before and after the course, and there was very little variation in answers. For example, in response to the statement “Computers are reliable,” 37 out of 38 (97%) agreed before the course, and 100% agreed after the course. In response to the statement “I feel comfortable using technology,” 37 out of 38 (97%) students agreed both before and after the course. Students were also interested in learning new technologies, with 36 out of 38 (95%) students agreeing with the statement “I am interested in learning new technologies” before the course and 33 (87%) students agreeing after the course. Additionally, in response to the statement “I am interested in learning new technologies that will help my teaching in the future,” 38 out of 38 (100%) students agreed before the course and 37 (97%) students agreed after the course. Students were confident using technology to learn and to teach. For example, in response to the statement “I am confident in using technology in my learning,” 38 out of 38 (100%) students agreed before the course and 37 (97%) students agreed after the course. Thirty-eight out of 38 (100%) students agreed with the statement “I am confident in using technology to teach” both before and after the course.
Table 11

**Student Comfort/confidence in Using Technology, Before and After TE 260 (n =38)**

<table>
<thead>
<tr>
<th>Questions/Statements</th>
<th>Somewhat Agree/Agree/Strongly Agree</th>
<th>Somewhat Disagree/Disagree/Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Computers are reliable.</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td>The more technology you use, the more respect you get from your peers.</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>I feel comfortable using technology.</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>I am interested in computers and related technologies.</td>
<td>34</td>
<td>33</td>
</tr>
<tr>
<td>I am interested in learning new technologies.</td>
<td>36</td>
<td>33</td>
</tr>
<tr>
<td>I am interested in learning new technologies that will help my teaching in the future.</td>
<td>38</td>
<td>37</td>
</tr>
<tr>
<td>I believe that technologies can help me teach better.</td>
<td>38</td>
<td>36</td>
</tr>
<tr>
<td>I believe that technologies can help my students learn better.</td>
<td>38</td>
<td>37</td>
</tr>
<tr>
<td>I can solve most of the problems when my computer does not work.</td>
<td>30</td>
<td>32</td>
</tr>
<tr>
<td>I am confident in using technology in my learning.</td>
<td>38</td>
<td>37</td>
</tr>
<tr>
<td>I am confident in using technology to teach.</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>I feel comfortable using the Internet to communicate with people.</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>I feel comfortable using technology to collaborate with people.</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>I feel comfortable using digital technologies to complete homework.</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>I feel comfortable using technologies to create products.</td>
<td>35</td>
<td>31</td>
</tr>
</tbody>
</table>
A dependent samples $t$-test was also calculated for items in Table 11. Statistical calculations can be seen in Table 12 and Table 13 below.

Table 12

*Mean and Standard Deviation for Items in Table 11*

<table>
<thead>
<tr>
<th>Paired Samples Statistics</th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 pretest</td>
<td>188.47</td>
<td>15</td>
<td>19.08577</td>
<td>4.92792</td>
</tr>
<tr>
<td>posttest</td>
<td>183.87</td>
<td>15</td>
<td>14.88943</td>
<td>3.84444</td>
</tr>
</tbody>
</table>

Table 13

*Paired Differences for Items in Table 11*

<table>
<thead>
<tr>
<th>Paired Samples Test</th>
<th>Paired Differences</th>
<th>95% Confidence Interval of the Difference</th>
<th>Std. Mean Deviation</th>
<th>Std. Error Mean</th>
<th>Mean Lower</th>
<th>Mean Upper</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pretest - posttest</td>
<td>4.600</td>
<td>6.66333</td>
<td>1.72047</td>
<td>.90997</td>
<td>8.29003</td>
<td>2.674</td>
<td>14</td>
<td>.018</td>
<td>.018</td>
</tr>
</tbody>
</table>

According to the data, student comfort and confidence in using technology after the course ($M = 183.87$) significantly decreased from student comfort and confidence in using technology before the course ($M = 188.47$), $t(14) = 2.674, p \leq .05$. The effect on student comfort and confidence in using technology was large, $d = 2.6744$. Therefore, although student comfort and confidence in using technology remained high after the course, there was a significant decrease in student comfort and confidence. It is possible that students’ experience with Second Life caused them to lose confidence in their overall ability to use technology. Their experience
with virtual worlds could also explain the drop in student interest in learning new technologies from 95% before the course to 87% after the course.

In the next section, statistical calculations for the three surveys are provided, as well as validity and reliability procedures. Calculations include Cronbach’s alpha, item-to-total correlations, and factor analysis to strengthen instrument reliability and validity.

**Statistical Analysis for Survey Instruments**

As originally reported in Chapter III, before Cronbach alpha was calculated the pre-survey and post-survey which were adapted from Lei’s (2009) Technology Use Survey were rated by a panel of experts to determine content validity of the instruments. Based upon the reviewer ratings, eight items were dropped from the 47-item survey to create a 39-item pre- and post-survey.

Also reported in Chapter III, to establish the validity of the Virtual World Experiences survey, a panel of five experts was selected to rate the instrument. Based upon the panel’s ratings, all items below an I-CVI of .80 were dropped, and further, any item with a rating of “1” was also dropped, leaving an instrument of 32 items with an S-CVI of .89. Next, Cronbach alpha was determined for all three instruments.

To determine a survey’s reliability, a Cronbach alpha of .80 and above provides a statistical measurement for internal construct consistency (Carmine & Zeller, 1979). The pre-survey (Technology Use Pre-Survey) was divided into two smaller instruments because the survey consisted of two different Likert-type scales. Pre-Survey One, therefore, consisted of items q1 to q18, and Pre-Survey Two consisted of items q19 to q39. The same process was followed for the post-survey (Technology Use Post-Survey), creating Post-Survey One and Post-Survey Two. The original Cronbach alpha for Pre-Survey One was .717. According to Nunnally
(1978), modest correlations (a correlation of .30) between test and criterion can prove useful for purposes of selection. Therefore, three items (q4: “Computers and related technologies isolate students from one another;” q14: “Sometimes technology can be a distraction;” and q13: “I feel comfortable using the Internet to shop.”) were dropped because each item had a Pearson correlation below .30. The new Cronbach alpha for Pre-Survey One was then calculated to be .828. Removing three items improved the instrument’s internal consistency. Table 14 displays the Cronbach alpha for all survey instruments used in the study.

Pre-Survey Two was then subjected to analysis. The original Cronbach alpha for Pre-Survey Two was .848. Next, two items (q28: “Using Second Life;” and q29: “Using LiveJournal.”) were dropped because each item had a Pearson correlation below .30. The new Cronbach alpha for Pre-Survey Two was then calculated to be .854.

The same process was followed for Post-Survey One. The original Cronbach alpha for Post-Survey One was .897. Next, one item (q4: “Computers and related technologies isolate students from one another.”) was dropped because the item had a Pearson correlation below .30. The new Cronbach alpha for Post-Survey One was then calculated to be .911.

Post-Survey Two was then subjected to analysis. The original Cronbach alpha for Pre-Survey Two was .883. No items were dropped because all had a Pearson correlation above .30. Therefore, the Cronbach alpha of .883 for Pre-Survey Two held.

The Virtual World Experiences survey was next subjected to statistical analysis. The original Cronbach alpha for the survey was .897. Next, four items (q7: “I found the wide-open environment inside the virtual world to be distracting;”q5: “It was easy to edit my avatar’s appearance;” q29: “Potential financial cost of operating inside a virtual environment would prevent me from using it in a K-12 classroom;” and q3: “It was easy to move (to walk, to run,
etc.) my avatar inside the virtual world."”) were dropped because each item had a Pearson correlation below .30. The new Cronbach alpha for the Virtual World Experiences survey was calculated to be .920. Table 14 shows the Cronbach alpha for all survey instruments. All items dropped at any point while calculating Cronbach alpha will be dropped from future surveys (Pre/Post Survey and Virtual World Experiences survey).

Table 14

Cronbach Alpha for the Three Survey Instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Cronbach alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Survey One</td>
<td>.828</td>
</tr>
<tr>
<td>Pre-Survey Two</td>
<td>.854</td>
</tr>
<tr>
<td>Post-Survey One</td>
<td>.911</td>
</tr>
<tr>
<td>Post-Survey Two</td>
<td>.883</td>
</tr>
<tr>
<td>Virtual World Experiences Survey</td>
<td>.920</td>
</tr>
</tbody>
</table>

High item-to-total correlations also document a survey’s reliability in that the items are measuring the same theoretical concept. For Pre-Survey One, the item-to-total correlation ranged from a low of .368 to a high of .827. For Pre-Survey Two, the item-to-total correlation ranged from a low of .370 to a high of .700. For Post-Survey One, the item-to-total correlation ranged from a low of .305 to a high of .905. For Post-Survey Two, the item-to-total correlation ranged from a low of .358 to a high of .671. For the Virtual World Experiences survey, the item-to-total correlation ranged from a low of .307 to a high of .793. Item-to-total correlations are presented in Table 15.
Table 15

*Item-to-Total Correlations for Three Survey Instruments*

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Item-to-Total Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Survey One</td>
<td>.368 to .827</td>
</tr>
<tr>
<td>Pre-Survey Two</td>
<td>.370 to .700</td>
</tr>
<tr>
<td>Post-Survey One</td>
<td>.305 to .905</td>
</tr>
<tr>
<td>Post-Survey Two</td>
<td>.358 to .671</td>
</tr>
<tr>
<td>Virtual World Experiences Survey</td>
<td>.307 to .793</td>
</tr>
</tbody>
</table>

Statistical Analysis of Qualitative Sources

In this section, data analysis procedures for data collected from qualitative sources, LiveJournal entries and focus group sessions, are presented. First, procedures for analyzing the qualitative data are presented, and then focus group procedures are described.

*LiveJournal Entry Procedures*

The four LiveJournal reflective prompts are listed below.

1) Prompt 1: “Describe your initial thoughts about Second Life. Do you think Second Life has potential as an educational tool? Please explain. What are your initial impressions of Second Life?”

2) Prompt 2: “Describe your experience in locating the various locations, in taking pictures, and in emailing the instructor. Did you find the locations and free items on your own, or did you complete it with a classmate or someone else? Did you have any problems/frustrations/successes? Please describe.”

3) Prompt 3: “Reflect on your experience participating in the role-play activity. Was it a positive/negative experience? Please explain. Did you have any problems with Second Life? How would you compare it to face to face role-play activity? Do you think a virtual world could be a potential place to hold parent/teacher conferences? Do you feel like you were prepared for the activity?”

4) Prompt 4: Reflect on your experience participating in the group building activity. Consider the following questions: (Did this activity help you become more comfortable with Second Life? Describe your experience working a group in Second
Life. Did your group meet in person, or over distance in Second Life to complete the project? Do you think this activity was relevant to the course? Do you think future students should learn about Second Life? Do you feel that you are now prepared to use Second Life and/or potentially other virtual worlds, either in your free time or potentially in an educational context?

LiveJournal entries were organized by journal entry and placed into separate documents. For example, all student reflective responses to the first LiveJournal prompt about Second Life were moved to one document, all student reflective responses to the second LiveJournal prompt about Second Life were moved to one document, and so on. Then, the student entries on each document were read individually, and were then read collectively. The same process was repeated a second time. Next, the entries were read to identify any patterns with any repeating words or phrases and these words and phrases were color-coded. Identified words and phrases were then read once more and organized into categories. After reading LiveJournal responses to entry 1, the following categories were identified: “Initial Reaction,” “Initial Concerns,” “Games” and “Potential Uses.” After reading LiveJournal responses to entry 2, the following categories were identified: “Frustrations” and “Successes.” After reading LiveJournal responses to entry 3, the following categories were extracted: “Operational Experiences” and “Comparison with Face-to-Face Role-Play.” After reading LiveJournal responses to entry 4, the following categories were extracted: “Relevance to Course,” “Communication and Collaboration,” and “Comfort and Confidence.” All categories were integrated into results and findings connected with specific research questions.

The data collected from LiveJournal prompts are reported in the following section called “Results by Research Question.” In that section, data from all sources are organized by research question of the study.
Focus Group Procedures

Five students in both sections of TE 260 were randomly selected to participate in two focus group sessions (one for each course section). Students were asked a series of questions related to their experiences in working in Second Life throughout the course. Each question was matched with a research question. Therefore, data collected from the focus group sessions are presented with the corresponding research question in the following section (The complete focus group guide can be found in Appendix I). The set of focus group session questions included in the analysis are listed below.

1) Before taking this course, did you feel that you had the skills necessary to work with Second Life and to use Second Life? (Connected to Research Question 3)

2) Do you feel that learning how to use Second Life could help you learn how to use other digital tools or virtual worlds? (Connected to Research Question 3)

3) In your opinion, do you think that Second Life or other virtual worlds have value as an educational tool? (Connected to Research Question 4)

4) In your opinion, do you think using Second Life could help pre-service teachers to help prepare you for teaching? What is the value, if there is any value? (Connected to Research Question 4)

5) After learning Second Life, do you have the confidence in it now, and would you have the confidence to use it as a teacher? (Connected to Research Question 5)

Results by Research Question

In this section, data gathered from the various sources of the study are organized by research question. Information collected from the Technology Use Pre-Survey, the Technology Use Post-Survey, the Virtual World Experiences survey, the LiveJournal reflective entries, and the focus group sessions are presented.
Research Question One

In research question one, the question, “What are the perceived challenges/problems that undergraduate pre-service teachers face when using a virtual world (Second Life)?” was asked. Data collected from the Virtual World Experiences survey and LiveJournal entries are presented.

The Virtual World Experiences survey asked several questions related to research question one (see Table 16). Students had difficulty operating inside Second Life. Only 15 (39.5%) students agreed that learning the virtual world was easy. No student believed that it was easy to communicate inside the virtual world. Fifty percent (n = 19) had difficulty editing their avatar’s appearance. On the other hand, most students (78.9 %) found it easy to move their avatar inside the virtual environment. Additionally, almost half (44.7 %) thought it was easy to find different locations, and 47.4% were not distracted while inside the environment.

Table 16

Challenges/problems Students Encountered in Second Life

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>Disagree (Strongly Disagree/Disagree)</th>
<th>Neutral</th>
<th>Agree (Strongly Agree/Agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I found the virtual world easy to learn.</td>
<td>8</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>It was easy to communicate inside the virtual world.</td>
<td>23</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>It was easy to move (to walk, to run, etc.) my avatar inside the virtual world.</td>
<td>3</td>
<td>5</td>
<td>30</td>
</tr>
<tr>
<td>It was easy to find different islands (locations) inside the virtual world.</td>
<td>7</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>It was easy to edit my avatar’s appearance.</td>
<td>19</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>I found the wide-open environment inside the virtual world to be distracting.</td>
<td>18</td>
<td>11</td>
<td>9</td>
</tr>
</tbody>
</table>
Chi-square analysis was also conducted on individual items in Table 16. The statement “I found the virtual world easy to learn” was determined to be statistically significant ($\chi^2$ (df 4) = 13.842, $p \leq .05$). The statement “It was easy to communicate inside the virtual world” was determined to be statistically significant, ($\chi^2$ (df 4) = 18.842, $p \leq .05$). Chi-square analysis for the statement “It was easy to move (to walk, to run, etc.) my avatar inside the virtual world” was not calculated because it was dropped while calculating Cronbach alpha. The statement ‘It was easy to find different islands (locations) inside the virtual world’ was determined to be statistically significant ($\chi^2$ (df 4) = 17.000, $p \leq .05$). Chi-square analysis for the statement ‘It was easy to edit my avatar’s appearance’ was not calculated because it was dropped while calculating Cronbach alpha. Chi-square analysis for the statement ‘I found the wide-open environment inside the virtual world to be distracting’ was not calculated because it was dropped while calculating Cronbach alpha.

According to chi-square analysis, it was significant that only 39% of students found the virtual world easy to learn. It was also significant that no students found it easy to communicate inside Second Life. Finally, it was significant that just 44.7% of students thought it was easy to find islands and locations inside Second Life.

The Virtual World Experiences survey also asked a series of statements about potential problems or barriers based upon the literature (see Table 17). Students indicated several reasons why they would not be willing to use virtual worlds in the future. Sixty-five percent (65.8%) would not use a virtual world due to fear of student exposure to inappropriate content. Seventy-three percent (73.7%) would not use virtual worlds due to concern of intrusion from uninvited avatars. Additionally, 78.9% said they would not use a virtual world because of the possibility of harassment from outside avatars. Fifty percent would not use one because they do not believe
students would consider it an educational tool. Other concerns noted were software and hardware requirements (44.7 %) and potential financial cost (57.9 %). Interestingly, only 26.3 % said that parental concern would prevent them from using a virtual environment.

Table 17

*Potential Barriers to Using a Virtual World*

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>Disagree (Strongly Disagree/Disagree)</th>
<th>Neutral</th>
<th>Agree (Strongly Agree/Agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential exposure of students to inappropriate content in a virtual world would prevent me from using it in a K-12 classroom.</td>
<td>6</td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td>Potential interruptions into class activities in a virtual world from uninvited avatars would prevent me from using it in a K-12 classroom.</td>
<td>4</td>
<td>6</td>
<td>28</td>
</tr>
<tr>
<td>The robust computer software and hardware requirements needed to operate virtual world software would prevent me from using it in a K-12 classroom.</td>
<td>11</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>Potential financial cost of operating inside a virtual environment would prevent me from using it in a K-12 classroom.</td>
<td>11</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td>Potential parental concern about their children operating in a virtual environment would prevent me from using it in a K-12 classroom.</td>
<td>7</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>The possibility of students being harassed by avatars not associated with official class activities would prevent me from using it in a K-12 classroom.</td>
<td>1</td>
<td>7</td>
<td>30</td>
</tr>
<tr>
<td>Potential reluctance of students to accept virtual worlds as an educational tool would prevent me from using it in a K-12 classroom.</td>
<td>9</td>
<td>10</td>
<td>19</td>
</tr>
</tbody>
</table>
Items in Table 17 were also subjected to chi-square analysis. The statement “Potential interruptions into class activities in a virtual world from uninvited avatars would prevent me from using it in a K-12 classroom” was determined to be statistically significant ($\chi^2$ (df 3) = 10.632, $p \leq .05$). The statement “Potential parental concern about their children operating in a virtual environment would prevent me from using it in a K-12 classroom” was determined to be statistically significant ($\chi^2$ (df 2) = 8.579, $p \leq .05$). The statement “The possibility of students being harassed by avatars not associated with official class activities would prevent me from using it in a K-12 classroom” was determined to be statistically significant ($\chi^2$ (df 3) = 15.474, $p \leq .05$). Chi-square analysis for the statement “Potential financial cost of operating inside a virtual environment would prevent me from using it in a K-12 classroom” was not calculated because it was dropped during Cronbach alpha calculations. The remaining items in Table 17 were not statistically significant. Therefore, according to chi-square analysis, traditional undergraduate pre-service teachers would not use virtual worlds with future students due to possible outside interference from avatars (74 %) or because of the potential harassment of students by avatars (79 %). Students were not concerned about potential parental concern (26 %).

According to LiveJournal reflections, students held some concerns about Second Life after their initial introduction to it. After students were first introduced to Second Life, they were asked to reflect by answering the prompt: “Describe your initial thoughts about Second Life. Do you think Second Life has potential as an educational tool? Please explain. What are your initial impressions of Second Life?” Initial student reactions to the introduction of Second Life in TE 260 ranged from “weird,” mentioned six times, and “creepy,” mentioned four times, to “fun,” mentioned eight times, and “cool,” mentioned four times. “Weird” held both a positive and negative meaning with a reference to “The Sims,” but most meanings were negative and usually
associated with “creepy.” Students using both “weird” and “creepy” indicated that this feeling stemmed from the ability of any avatar inside the virtual world to contact you, with “strange people trying to talk to me.” One cause of frustration originated from difficulty initially setting up the student’s Second Life accounts, and the resulting complication in adjusting to the controls (interface) and editing the avatar’s appearance. Many more students said they thought Second Life was “fun” or “cool.” Students indicated that it was “fun” because they liked creating their avatar and changing their appearance, they enjoyed exploring the virtual world, and Second Life used real money. Some students thought it was “cool” because they could fly around, they liked the replicas of university buildings inside the virtual environment, and it was a “cool way to get involved in a digital world and physically get involved in the learning.”

Students also identified a few concerns. Initially, students wondered “how in the world it could be used as an educational tool.” Indeed, one student believed it was a waste of time, and a few students did not see how Second Life could be used as an educational tool. They were also concerned about the security features of Second Life and the safety of their future students. Some students thought that Second Life would not be safe enough for elementary students. Another student said that before using Second Life with students he/she would “need to see security measures and their effectiveness.” One student mentioned the ability of students to wander off and be exposed to inappropriate content, and a few were concerned about students being distracted. One student expressed concern about parental access to computers and Second Life.

After completing the second activity in Second Life, several students voiced frustration. Seven students mentioned the word “frustrating” to describe completing the second Second Life activity, two students used the word “difficult,” and one student used the words “annoying” and “irritating.” Students were frustrated for a number of reasons. Five students indicated they had
problems locating free items and when they did find free items, six had issues discovering how to retrieve and attach the items. Some items marked “free” prompted students to purchase them with money when selected. Six students expressed frustration with using the picture feature. They could not determine how to take a picture, or they could not turn their avatar around to face the camera. Another student had a problem emailing a picture to the instructor.

After completing activity three (virtual parent-teacher conference), four students had difficulty with the search function and teleporting. During a class session, the search function did not always return desired results, and students expressed that it was easy to get disoriented when teleporting to a new island. Three students mentioned encountering inappropriate content during their exploration, even when they had marked “PG” in the search function box. Two students had problems with either hardware or software. One student had a Mac, and while the software did download onto the computer it would not load or work properly. Another student downloaded Second Life onto a personal computer, but objects would take an extended amount of time to download and appear. One student became so frustrated with the operational functions of Second Life that they said Second Life was “something that would not be useful in the classroom.”

Most students had no problem finding the conference’s location in activity three (parent-teacher virtual conference), but two students did. One student went into the wrong building and waited, until realizing the error. Communication between partners using the chat function was not a problem, although two students mentioned lag time between message postings from their partner. In terms of avatar appearance, most students believed they no longer had an issue changing their appearance, though two students were still experiencing problems. Two students indicated they were distracted during the activity, with one student saying “I found it very hard to have my full concentration on the conversation I was having.” One student had a problem with
the avatar appearing as a “cloud-like figure” but the student “simply Googled my issue and the problem was quickly fixed within five minutes.” Two students stated that they needed assistance from the instructor learning how to sit down. Two students also experienced an interruption from an outside party as they were ending their conference. The avatar refused to leave and in fact, harassed the students and the instructor. Finally, one student failed to take the assignment and the activity seriously, saying “I found myself laughing a lot while doing this assignment simply because it does not offer the face to face seriousness.”

After activity four (group building activity), three students expressed that activity four was not relevant to the course. One student believed that future students should not learn about Second Life because it “should not replace a real classroom.” Another student expressed that it provides an opportunity for group work, but then says that he/she does not “understand the relevance of Second Life building for educational purposes.” A third student stated that because the student will never use Second Life again, it should therefore be left out of the course.

Research Question Two

For research question two, “What are the perceived potential educational uses/benefits of a virtual environment (Second Life) in a technology course,” data were collected from the Virtual World Experiences survey, LiveJournal entries, and the focus group sessions. Survey statements from the Virtual World Experiences survey were aligned with 21st century skills as described by the Partnership for 21st Century Skills (see Table 18). The statements were derived from the framework provided by the Partnership for 21st Century Skills and reflect student activities described in the framework. Pre-service teachers were asked whether they believed virtual worlds as a tool could be implemented such that students could achieve various educational benefits.
Table 18

*Survey Questions and Corresponding 21st Century Skill*

<table>
<thead>
<tr>
<th>Question</th>
<th>21st Century Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual worlds could be used to encourage collaboration among students.</td>
<td>Communication and Collaboration</td>
</tr>
<tr>
<td>Virtual worlds could be used by students to brainstorm new ideas</td>
<td>Creativity and Innovation</td>
</tr>
<tr>
<td>concerning how to solve problems.</td>
<td></td>
</tr>
<tr>
<td>Virtual worlds could be used to help students learn how to make</td>
<td>Economic Literacy</td>
</tr>
<tr>
<td>economic decisions.</td>
<td></td>
</tr>
<tr>
<td>Virtual worlds could be used by students to communicate thoughts/ideas</td>
<td>Communication and Collaboration</td>
</tr>
<tr>
<td>in diverse environments.</td>
<td></td>
</tr>
<tr>
<td>Virtual worlds could be used by students to find/assess different</td>
<td>Information Literacy</td>
</tr>
<tr>
<td>sources of information.</td>
<td></td>
</tr>
<tr>
<td>Virtual worlds could be used by students to study ethical issues</td>
<td>ICT Literacy</td>
</tr>
<tr>
<td>surrounding the use of information technologies (digital technologies,</td>
<td></td>
</tr>
<tr>
<td>Web 2.0 tools, etc).</td>
<td></td>
</tr>
<tr>
<td>Virtual worlds could be used by students to work with diverse students</td>
<td>Global Awareness</td>
</tr>
<tr>
<td>from around the world.</td>
<td></td>
</tr>
<tr>
<td>Virtual worlds could be used by students to participate in civic life</td>
<td>Civic Literacy</td>
</tr>
<tr>
<td>by learning about government processes.</td>
<td></td>
</tr>
<tr>
<td>Virtual worlds could be used by students to obtain information</td>
<td>Health Literacy</td>
</tr>
<tr>
<td>about healthy living.</td>
<td></td>
</tr>
<tr>
<td>Virtual worlds could be used by students to practice critical</td>
<td>Critical Thinking and</td>
</tr>
<tr>
<td>thinking skills while solving problems.</td>
<td>Problem-Solving</td>
</tr>
<tr>
<td>Virtual worlds could be used by students to create media products.</td>
<td>Media Literacy</td>
</tr>
<tr>
<td>Virtual worlds could be used by students to learn how to negotiate</td>
<td>Flexibility and Adaptability</td>
</tr>
<tr>
<td>with team members on group projects.</td>
<td></td>
</tr>
<tr>
<td>Virtual worlds could provide leadership opportunities for students</td>
<td>Leadership and Responsibility</td>
</tr>
<tr>
<td>while they work with other students.</td>
<td></td>
</tr>
<tr>
<td>Virtual worlds could provide opportunities for students to be self-</td>
<td>Initiative and Self-Direction</td>
</tr>
<tr>
<td>directed learners.</td>
<td></td>
</tr>
</tbody>
</table>
Students identified several ways in which a virtual world could be used in educational contexts while at the same time addressing 21st century skills. Sixty-eight percent (68.4%) said virtual worlds could foster collaboration among students. Seventy-three percent (73.7%) believed it could be used to brainstorm new ideas to solve problems. Students also indicated that virtual worlds could be used to communicate thoughts/ideas in diverse environments (71.1%), to find/assess different sources of information (60.5%), to work with students from around the world (78.9%), to create media products (81.6%), to negotiate with team members (89.5%), to practice critical thinking skills (71.1%), to provide leadership opportunities (76.3%), and to provide opportunities for self-directed learning (86.8%). Students were not as convinced that a virtual world could help students learn how to make economic decisions (39.5%), to study ethical issues surrounding the use of information technologies (57.9%), to participate in civic life (44.7%) or obtain information about healthy living (34.2%).

All items in Table 18 were subjected to chi-square analysis, and all were found to be statistically significant. The statement “Virtual worlds could be used to encourage collaboration among students” was determined to be significant ($\chi^2$ (df 4) = 40.947, $p \leq .05$). The statement “Virtual worlds could be used by students to brainstorm new ideas concerning how to solve problems” was determined to be significant ($\chi^2$ (df 3) = 25.789, $p \leq .05$). The statement “Virtual worlds could be used by students to help students learn how to make economic decisions” was determined to be significant ($\chi^2$ (df 4) = 12.263, $p \leq .05$). The statement “Virtual worlds could be used by students to communicate thoughts/ideas in diverse environments” was determined to be significant ($\chi^2$ (df 4) = 40.684, $p \leq .05$). The statement “Virtual worlds could be used by students to find/assess different sources of information” was determined to be significant ($\chi^2$ (df 4) =
The statement “Virtual worlds could be used by students to study ethical issues surrounding the use of information technologies (digital technologies, Web 2.0 tools, etc)” was determined to be significant ($x^2 (df 4) = 21.474, p \leq .05$). The statement “Virtual worlds could be used by students to work with diverse students from around the world” was determined to be significant ($x^2 (df 4) = 43.053, p \leq .05$).

The statement “Virtual worlds could be used by students to participate in civic life by learning about government processes” was determined to be significant ($x^2 (df 4) = 22.789, p \leq .05$). The statement “Virtual worlds could be used by students to obtain information about healthy living” was determined to be significant ($x^2 (df 4) = 16.737, p \leq .05$). The statement “Virtual worlds could be used by students to practice critical thinking skills while solving problems” was determined to be significant ($x^2 (df 3) = 31.263, p \leq .05$). The statement “Virtual worlds could be used by students to create media products” was determined to be significant ($x^2 (df 4) = 47.000, p \leq .05$). The statement “Virtual worlds could be used by students to learn how to negotiate with team members on group projects” was determined to be significant ($x^2 (df 3) = 31.474, p \leq .05$). The statement “Virtual worlds could provide leadership opportunities for students while they work with other students” was determined to be significant ($x^2 (df 4) = 36.737, p \leq .05$). The statement “Virtual worlds could provide opportunities for students to be self-directed learners” was determined to be significant ($x^2 (df 4) = 58.579, p \leq .05$).

According to LiveJournal entries, students identified several possible educational uses of virtual worlds. One student mentioned using Second Life to learn about the fiscal responsibility by creating a “virtual reality style marketplace.” Two students mentioned using SL for high school students or for college recruitment virtual visits. A few students liked that Second Life could provide students an opportunity to meet and chat with friends and classmates both inside
and outside of the classroom. Other potential uses mentioned included learning about math and physics in Second Life, scavenger hunts, building projects, and historical field trips.

Many students called Second Life a “game,” comparing it to other games they had either played or knew. One student compared Second Life to a game called “Zoo Tycoon” that the student played as a child. In “Zoo Tycoon,” a player must be the first person to build a successful zoo and earn a profit. Five students also made comparisons between Second Life and a game called “The Sims.” In “The Sims,” players take on the form of an avatar and proceed to build a life, which could include building a home and creating a family, while interacting with other players and the environment. One student mentioned that he/she was not a video game player, and indicated that Second Life was a “waste of time.” Two students believed that since Second Life was a game, it would attract the attention and interest of students.

Although most students enjoyed the experience of the virtual parent-teacher conference in activity three, students expressed both positive and negative opinions when comparing the virtual parent-teacher conference in Second Life to a face-to-face parent-teacher conference. Many students believed it possible to hold parent-teacher conferences in a virtual world because “it still has many characteristics of a face to face conversation.” Those students who were positive about Second Life’s use referred to parents being able to save time. Said one student, “it would allow for a parent to stay at home and still meet with his/her child's teacher.” Another student said, “I can imagine parents would be busier than I am, so being able to just turn on the computer and have the conference while they go on with their regular routine would be nice.” One student also believed a virtual environment would be helpful because of the “absence of emotions,” saying “conferences are often met with anxiety” and “Second Life offers an opportunity for both parties to communicate with each other without emotions getting
involved.” A couple of students preferred the virtual world setting because it gave them time to think about what they typed.

Many of the negative opinions or drawbacks about using a virtual conference when compared to a face-to-face conference related to the virtual world’s inability to display human emotion or voices. (Students were not told about the different ways to communicate through text and voice. No student discovered the voice chat component, and all of them used the text chat function.) One student stated “it is sometimes hard to figure out a person’s emotions when you cannot see them.” Another student said with a virtual conference “you loose the personal contact, which is extremely important.” Other concerns included not seeing someone’s facial expressions, not being able to hand actual work to parents, and lack of access to technology for parents.

Although most students enjoyed the experience and believed a virtual world could be used for a parent-teacher conference, almost all students preferred a face-to-face conference over a virtual one. Two students stated they would rather use Skype, an Internet-based video conferencing program. The following quote from one student sums up the experience: “As far as a comparison to face-to-face, I think it basically accomplishes the same things doing a virtual conferencing, except for the aspect of reading the person.”

After completing the group building activity in activity four (group building activity) inside Second Life, twenty students commented that the activity was relevant to the course. Students indicated that the activity was relevant for several reasons, including that it was based on project based learning, that “it taught us more about what could be the future of our teaching professions,” because the purpose of the course was to incorporate technology into the classroom, because it is always beneficial for students to learn new tools, and because technologies such as Second Life will be used in the near future, and it is a “wonderful way to
incorporate technology into the classroom.” Another student mentioned that the activity was relevant because it made them utilize 21st century skills.

Communication and collaboration were themes repeatedly expressed by students after activity four. Communication proved important because it directly influenced how students collaborated on the group project in Second Life. Every student said their group decided to complete the activity either during class time or during lab time, with all members physically present. One student’s comment summed up the general attitude of team members: “I think it worked better for us to work together in person, we were able to communicate better and able to show each other things that confused each of us and learn second life better.” As students collaborated with each other inside Second Life, they communicated with each other outside of Second Life. Said one student, “We all entered Second Life to work on building our pieces, but we were able to communicate verbally with each other because we were working beside each other.” In terms of collaboration, almost all students indicated they enjoyed the group activity. One student said they liked the group aspect of the project “because I had people there to bounce ideas off of,” and “I didn’t feel so overwhelmed.” Another student concurred, stating “we all learned a lot from feeding off of each other; this was good because we were able to relate any confusion to one another easily.” Again, working in a group “made the project less stressful” and they “contributed to each other's work to get the best result possible.” All groups successfully built objects in Second Life, such as a school bus, a basketball court, a tennis court, a Native American village, a diorama of the solar system, and several play grounds.

Research Question Three

In research question three, the question, “Do undergraduate pre-service teachers believe that the Second Life interventions have provided them the proficiency to operate in a virtual
environment” was asked. Data collected from the Virtual World Experiences survey, LiveJournal entries, and focus group sessions are presented. From the Virtual World Experiences survey, three questions helped answer this research question (see Table 19). Twenty students (52.6 %) believed that collaborating with team members to complete the team building activity in Second Life was easy. Twenty-five students (65.8 %) indicated that they had the necessary skills to use virtual worlds after taking the course. Twenty-eight students (73.7 %) said that virtual world activities completed during the course helped them learn to operate effectively inside virtual worlds.

Table 19

Second Life Interventions and Proficiency

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>Disagree (Strongly Disagree/Disagree)</th>
<th>Neutral</th>
<th>Agree (Strongly Agree/Agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborating with team members to complete the team building activity in Second Life was easy.</td>
<td>6</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>After taking this course, I have the skills necessary to use virtual worlds.</td>
<td>6</td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td>The virtual world activities we completed during the course helped me learn how to operate effectively inside virtual worlds.</td>
<td>4</td>
<td>6</td>
<td>28</td>
</tr>
</tbody>
</table>

Chi-square analysis was also performed for the three items in Table 19, and all three were found to be statistically significant. The statement “Collaborating with team members to complete the team building activity in Second Life was easy” was determined to be significant ($\chi^2$ (df 3) = 15.474, $p \leq .05$). The statement “After taking this course, I have the skills necessary to use virtual worlds” was determined to be significant ($\chi^2$ (df 4) = 27.789, $p \leq .05$). The
statement “The virtual world activities we completed during the course helped me learn how to
operate effectively inside virtual worlds” was determined to be significant ($x^2 (df 3) = 25.789, p \leq .05$).

According to LiveJournal entries, students did achieve a degree of success. After
completing activity two, 18 students believed the various tasks in activity two were “easy.” Six
students thought the activities were “not too difficult.” One student said that the activities were
like a “scavenger hunt.” Four students said that the activity was either “fun” or that they
“enjoyed” it. Six students enlisted the assistance of fellow classmates to help them complete the
tasks. Classmates who provided help allowed their classmates to feel more confident or to
complete the tasks. Students asking for help usually completed tasks on their own until they
reached a difficult task, and then they asked for help. In other words, most students completed
tasks successfully on their own. One student was also not shy about asking for help in Second
Life, stating “I encountered friendly people in the free places that helped me find free clothing
items and shoes, which I'm now wearing.” Another student used emails from Second Life to help
complete the assignment, saying, “Second Life has sent me a few emails to help me get started
which is how I found The Dove Shop.” While some students were not entirely confident with
using Second Life, they were positive, saying that, “I haven’t quite figured everything out yet,
but I’m getting there,” and “I think Second Life will be easier to navigate once I get used to it.”

After completing activity three, eighteen students indicated that the parent-teacher
Second Life conference was a positive experience. Almost all students believed they were
prepared for the activity, although two said they wished they had done more preparation.
Overall, students believed their skills in operating inside and using Second Life had improved.
Many students said they had no problems with using Second Life during the activity.
After completing activity four, students expressed a wide range of opinions when it came to comfort and confidence in using Second Life. Twenty-two students indicated that the group building activity helped them learn more about Second Life, particularly in regards to the building tools. Eleven students indicated that after the completing the activity they were more comfortable with using Second Life/virtual worlds. Two students said they were “ok” with Second Life but did not feel “100% comfortable” using it. One student already was comfortable with Second Life before completing the activity.

During the focus group sessions at the end of the course, students were asked the question, “Before taking this course, did you feel that you had the skills necessary to work with Second Life and to use Second Life?” Seven students indicated that they did not have the skills prior to take the course, while three students indicated they did have the skills. Said one student, “no, not before it was explained.” Students were also asked the question, “Do you feel that learning how to use Second Life could help you learn how to use other digital tools or virtual worlds?” Nine students indicated that learning how to use the virtual world potentially could help them learn other digital tools, and one student was silent. Said one student, “I think any time you learn any kind of technology or a new technology program it helps.”

Research Question Four

In research question four, the question, “Do undergraduate pre-service teachers believe that Second Life is a viable educational tool/environment?” was asked. Data collected from LiveJournal entries and focus group sessions are presented.

Different students throughout the process of completing the activities mentioned that Second Life was a viable tool in a number of ways. After activity one (where participants were introduced to Second Life and created their avatar), a student mentioned using the virtual
environment with students to learn about math and physics. Students also identified potential uses such as scavenger hunts, building projects, and historical field trips. Further, although some students expressed frustration with activity two (completing several tasks), many successfully completed the activity despite the frustration. Most students enjoyed activity three, the parent-teacher virtual conference, and were successful in completing it. Only two students failed to participate. After activity four, a student explained that Second Life could be used for architecture students. In activity four, students successfully worked in groups to build objects of their choosing, and in the process used the 21st century skills of collaboration, communication, creativity, and problem solving. Many students believed that the virtual environment could be an educational tool, but several were hesitant to consider using it in an elementary environment.

During the focus group sessions, students were asked the question, “In your opinion, do you think that Second Life or other virtual worlds have value as an educational tool?” Two students thought that Second Life could not be used as an educational tool, saying, “I don’t think it could help with like the core academic classes.” Another student believed that Second Life could be used in an architecture or interior design class at the high school or college level. Reaching kinesthetic learners (gamers) were mentioned as one possible usage of Second Life. Students also mentioned using the virtual world for virtual field trips, particularly if a school did not have financial resources to go on a real field trip. Throughout the process however, students expressed hesitation about using virtual worlds in elementary settings.

During the focus group sessions, students were also asked “In your opinion, do you think using Second Life could help pre-service teachers to help prepare you for teaching? What is the value, if there is any value?” Nine students said yes, for various reasons. One student said that SL could be used to meet with teachers outside of class and two students mentioned the virtual
parent-teacher conference as a positive reason for using Second Life. Another student believed that using Second Life would be beneficial because “you have to adapt pretty quick or you’re going to get left behind.”

Research Question Five

In research question five, the question “How confident/comfortable do undergraduate pre-service teachers feel about using virtual worlds and other digital technologies” was asked. Data collected from the Virtual World Experiences survey, the Technology Use Pre-Survey, the Technology Use Post-Survey, LiveJournal entries, and focus group sessions are presented.

Two questions in the Virtual World Experiences survey attempted to answer this question in relation to virtual worlds (see Table 20). On the question “In the future, as a teacher I would feel comfortable using Second Life with my students,” only ten (26.3%) students agreed. On the question, “In the future, as a teacher I would feel comfortable using virtual worlds with my students,” only seven (18.4%) students agreed. Chi-square analysis was also conducted for items in Table 20. The statement “In the future, as a teacher I would feel comfortable using Second Life with my students” was not statistically significant. The statement “In the future, as a teacher I would feel comfortable using virtual worlds with my students” was determined to be statistically significant \( \chi^2 (df 4) = 21.211, p \leq .05 \). Therefore, students were not comfortable with the prospect of using virtual worlds with future students (18.4%).
Table 20

*Comfort/Confidence in Using Second Life or Virtual Worlds in Future*

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>Disagree (Strongly Disagree/Disagree)</th>
<th>Neutral</th>
<th>Agree (Strongly Agree/Agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the future, as a teacher I would feel comfortable using Second Life with my students.</td>
<td>15</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>In the future, as a teacher I would feel comfortable using virtual worlds with my students.</td>
<td>13</td>
<td>18</td>
<td>7</td>
</tr>
</tbody>
</table>

The Technology Use Pre-Survey and Technology Use Post-Survey asked students about how they viewed their proficiency level in using different technologies and solving computer-related problems. Below, technologies have been divided into two categories: every day technologies, and TE 260 technologies. Every day technologies include tools that students commonly use (see Table 21), whereas TE 260 technologies include tools and technologies (see Table 22) specifically taught to students during the TE 260 course.
Table 21

Proficiency Level and Everyday Use Technologies, Pre-survey and Post-survey

<table>
<thead>
<tr>
<th>Technology Tool or Activity</th>
<th>None</th>
<th>Beginner</th>
<th>Moderate</th>
<th>Substantial</th>
<th>Expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigating the Web</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Finding information in Web searches</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Using E-mail</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Using Web-Based course management software (i.e. E-Learning, Blackboard, etc.)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>Maintaining a personal social networking site (i.e. Facebook, MySpace, etc.)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Desktop publishing (using Microsoft Word)</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Using presentation software (such as Microsoft PowerPoint)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Using a digital camera</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

As can be seen by looking at Table 21, there is very little change in proficiency level in every-day use technologies from the Technology Use Survey pre-survey (Pre) and the Technology Use post-survey (Post). The highest level of perceived proficiency level indicated by students were using email (60.5 % indicating ‘Expert’ before and 68.4 % after), using digital cameras (63.2 % indicating ‘Expert’ before and 60.5 % after), and social networking (63.2 % indicating ‘Expert’ before and 65.8 % after). As for the remaining tools and activities, a majority of students indicated “Moderate” or higher both before and after the course. All students marked
“Moderate” or higher in navigating the Web, finding information in Web searches, and using presentation software.

Table 22 includes technologies taught during the TE 260 course, and student proficiency level in using these technologies shows more change. Overall, the general trend is upward from “None” to “Expert.”

Table 22

<table>
<thead>
<tr>
<th>Student Proficiency Level and TE 260 Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology Tool or Activity</td>
</tr>
<tr>
<td>------------------------------</td>
</tr>
<tr>
<td>Blogging</td>
</tr>
<tr>
<td>Developing a wiki</td>
</tr>
<tr>
<td>Using Twitter</td>
</tr>
<tr>
<td>Using Gmail</td>
</tr>
<tr>
<td>Using Second Life</td>
</tr>
<tr>
<td>Using LiveJournal</td>
</tr>
<tr>
<td>Using Survey Monkey</td>
</tr>
</tbody>
</table>

The most significant changes in perceived student proficiency came from Twitter, Second Life, LiveJournal, and Survey Monkey. For example, with Twitter, students indicating “none” for no experience went from twenty before the course to two after the course. Those who considered themselves beginners fell from ten to four, and those who thought they had moderate experience increased from five to fourteen students. In regards to Second Life, students identifying “none” fell from thirty-one to one, beginners increased from six to eighteen students, and those with moderate experience increased from zero to fourteen students. However, only
four students thought they had moderate experience with Second Life after the course, and only one student indicated “Expert.”

All items in Table 21 and Table 22 were subjected to a dependent samples t-test. Statistical calculations can be seen in Table 23 and Table 24 below.

Table 23

*Mean and Standard Deviation for Items in Table 21 and Table 22*

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 pretest</td>
<td>124.63</td>
<td>19</td>
<td>36.35</td>
<td>8.34</td>
</tr>
<tr>
<td>posttest</td>
<td>133.74</td>
<td>19</td>
<td>31.38</td>
<td>7.19</td>
</tr>
</tbody>
</table>

Table 24

*Paired Differences for Items in Table 21 and Table 22*

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Pair 1 pretest - posttest</td>
<td>-9.10</td>
<td>12.05</td>
<td>2.76</td>
<td>-14.91</td>
<td>-3.29</td>
</tr>
</tbody>
</table>

According to the data, student perceived proficiency in using “everyday use” technologies and Web 2.0 technologies after the course (M = 133.74) significantly increased from student perceived proficiency in using “everyday use” technologies and Web 2.0 technologies before the course (M = 124.63), t(18) = -3.29, p ≤ .05. The effect on perceived student proficiency in using “everyday use” technologies and Web 2.0 technologies was large, d = 0.756. Therefore, overall, students’ perceived ability to use both “everyday” use technologies
and newer technologies introduced in the course increased from before the course to after the course.

According to LiveJournal entries, after completing activity four, twenty-one students indicated that after completing the activity and the course they were prepared to use Second Life or virtual worlds either to teach or for recreational purposes. However, some students who believed they were prepared also indicated they would need more practice and time, and were not experts. For example, one student said, “I do not think I am fully prepared with Second Life to use it in an educational context, but I think if I took more time with it I could potentially use it in the future.” Likewise, another student commented that they had the “general knowledge” to feel comfortable using Second Life, but they “would need more Second Life knowledge to actually teach a lesson.” Another student who was prepared still had issues navigating Second Life.

A couple of students still said they were not prepared to use Second Life in any context. One student believed that students would need to spend more time just on learning Second Life, rather than learning Second Life along with other tools. Another student said that although they were not now prepared, if “I took more time with it I could potentially use it in the future.” Only two students stated outright that they would never use Second Life or virtual worlds.

During the focus group sessions, students were asked “After learning Second Life, do you have the confidence in it now, and would you have the confidence to use it as a teacher? Six out of ten students indicated that they were confident enough to use it as a teacher. An additional student said “somewhat.” Only one student expressed a lack of confidence, saying, “I don’t know. I’m still not very confident.” Those who were confident liked using it for different reasons. One student would use Second Life only in a teacher-led context. Another student
mentioned using SL to conduct a classroom discussion, and one student said that they would use SL because “it allows them to have creativity.” Students still mentioned the possibility of encountering inappropriate material and the chance of encountering random people as factors limiting its use.

In the next chapter, conclusions, findings, and recommendations are presented. First, the purpose of the study is reiterated; the central research question and research sub-questions are restated. Then, findings are presented by research question. Conclusions are then presented, followed by a set of recommendations, and closing remarks.
CHAPTER V:
CONCLUSIONS, FINDINGS, AND RECOMMENDATIONS

Introduction

The purpose of the study was to gain an understanding of the experiences of undergraduate pre-service teachers in a virtual world (Second Life) as the virtual world is introduced into a course. The central research question of this study was “Are undergraduate pre-service teachers who participate in a virtual Web 2.0 experience sufficiently prepared to function in a virtual world?” The following five sub-questions were also addressed:

1) What are the perceived challenges/problems that undergraduate pre-service teachers face when using a virtual world (Second Life)?

2) What are the perceived potential educational uses/benefits of a virtual environment (Second Life) in a technology course?

3) Do undergraduate pre-service teachers believe that the Second Life interventions have provided them the proficiency to operate in a virtual environment?

4) Do undergraduate pre-service teachers believe that Second Life (or other virtual worlds) is a viable educational tool/environment; and

5) How confident do undergraduate pre-service teachers feel about using virtual worlds and other digital technologies?

The desired outcomes were obtained from data collected from the three survey instruments, LiveJournal entries, and focus group sessions. A total of 38 out of 43 (88%) students enrolled in two sections of TE 260 participated in the study. The participants included
thirty-two females and six males, nineteen upper division students and nineteen lower division students, and twenty-three students age 19 to 20 years and fifteen students age 21 to 31 years. The participants answered a Technology Use Pre-Survey on the first day of the course. Then, throughout the course they completed four activities in Second Life, and reflected on these activities in LiveJournal. At the end of the course, participants completed the Virtual World Experiences survey and the Technology Use Post-Survey. Finally, five students were drawn at random from each section to participate in a focus group session, with a total of two focus group sessions with a total of ten students. The three survey instruments underwent a rigorous process to determine validity and reliability.

In the next section, information gathered from the various sources (surveys, LiveJournal entries, and focus groups) are organized by research sub-question.

**Findings**

**Research Question One:**

*What are the perceived challenges/problems that undergraduate pre-service teachers face when using a virtual world (Second Life)?*

Pre-service teachers experienced several challenges and problems as they learned how to use virtual worlds. Previous findings in Jarmon et al. (2008), Luo et al. (2008), McKay et al. (2008), McVey (2008), Sanchez (2009), and Schultze et al. (2008) suggested that Second Life’s complex interface and steep learning curve could be a potential barrier to student learning and acceptance of Second Life. The findings reported in Chapter IV support these findings. Only 39% of students indicated that the virtual world was easy to learn, 50% of students had a difficult time editing their avatar’s appearance, and not a single student thought it easy to communicate inside Second Life. This is surprising because Second Life uses a text chat function similar to
text chat functions used in instant messaging, on cell phones, and on social networking sites. Approximately 45% of students found it easy to search for new locations inside Second Life, while 79% said it was easy to move their avatar. Only 24% of students found themselves distracted inside Second Life.

Pre-service teachers also identified several potential barriers, also mentioned in previous studies, which would prevent them from using a virtual world in a classroom setting. Chow et al. (2007), Luo et al. (2008), Hayes (2006), and McKay et al. (2008) discussed the possibility of student distraction and exposure to inappropriate content. Likewise, approximately 66% of students in the study would not use a virtual world with students due to possible exposure to inappropriate content. Approximately 74% indicated they would not use a virtual world due to the possibility of interruption from outside avatars, and 79% would not because of the potential for harassment from outside avatars. Other researchers (FitzGibbon et al., 2008; Jarmon et al., 2008; Lambert et al., 2008; Vogel et al., 2008) point to the possibility of student reluctance to accept Second Life as an education tool. Likewise, 50% mentioned reluctance of students to accept a virtual world as an education tool as a potential barrier. Echoing the finding of previous researchers (Chow et al., 2007; Franklin et al., 2007; Luo, et al., 2008; Sanchez, 2009; Schultze et al., 2008), 45% of students identified hardware/software requirements as a potential barrier. Several students attempted to download the Second Life software onto their computer, but the software was too complex; the software either failed to load or crashed the computer. Consequently, most students only used Second Life on campus in the computer lab. Students (58%) also identified potential financial cost as a barrier. Surprisingly, only 26% said that potential parental concern would be a barrier.
LiveJournal reflections added some depth to student survey responses. Many students thought that Second Life was fun upon their initial introduction, though a few thought it was “weird” or “creepy.” Students specifically mentioned feeling uneasy about being approached by random avatars inside Second Life. Two students did not see the value of virtual worlds as an educational tool. They were also concerned about security features for their future students, as they were worried about exposure to inappropriate content and harassment from avatars unrelated to the course or class. Students also expressed frustration with executing basic tasks in Second Life, such as finding and acquiring free items and in moving (walking/running/flying) their avatar. Although many students experienced difficulty in changing the appearance of their avatar, by the end of the course most students had grown more confident.

**Research Question Two:**

*What are the perceived potential educational uses/benefits of a virtual environment (Second Life) in a technology course?*

Despite experiencing some frustrations, pre-service teachers identified several ways in which virtual worlds could be used in educational contexts and to address 21st century skills. Students believed that a virtual world could be used: to promote student collaboration and to communicate in diverse environments (71%) (communication and collaboration), to foster brainstorming (74%) (creativity and innovation), to work with students from around the world (79%) (global awareness), to practice critical thinking (71%) (critical thinking and problem-solving), to work on group projects (84%) (flexibility and adaptability), to provide leadership opportunities (76%) (leadership and responsibility), to create media products (82%) (media literacy), and to encourage self-directed learning (87%) (initiative and self-direction).
In LiveJournal reflections, students also mentioned potential uses of Second Life. Among them, to create a “virtual marketplace,” for college recruitment, to play games such as those created in Franklin et al. (2007), to meet with friends inside and outside of class (i.e., social interaction and community such as described in De Lucia et al. (2009) and Gillen (2009), to go on scavenger hunts or field trips, and to complete building projects. Students universally enjoyed the virtual parent-teacher conference, although some preferred face-to-face conferences due to the virtual world’s lack of ability to express human emotion. Gao et al. (2008), Mayrath et al. (2008), and Rappa et al. (2009) had each previously used Second Life to successfully role-play. As reported in Brown et al. (2008), Delwiche (2006), Good et al. (2008), Jarmon et al. (2008), and Mayrath et al. (2007), which all previously used Second Life for group projects, students also expressed satisfaction with the group building project.

Research Question Three:
Do undergraduate pre-service teachers believe that the Second Life interventions have provided them the proficiency to operate in a virtual environment?

Most students believed that course activities improved their technology skills and helped them learn how to operate inside virtual environments, but approximately a third of the students still were unprepared to use Second Life proficiently. Approximately 74% of students believed that the in-class Second Life activities completed during the course helped them learn how to operate effectively inside virtual worlds. Approximately 66% of students thought the course provided them with the skills to operate successfully inside virtual environments.

During focus group sessions, seven out of ten students said they did not have the skills to operate in virtual environments before taking the course. Nine students believed that successfully learning how to use virtual worlds could potentially help them learn other digital tools.
According to LiveJournal entries, twenty-four students had no problems with completing activity two (Second Life scavenger hunt). Most students had no issues in completing activity three (virtual parent-teacher conference), and almost all students believed that their skills had improved since the first activity. Twenty-two students indicated that the group building activity (activity four) helped them learn more about Second Life, and eleven students thought they were more comfortable with using Second Life/virtual worlds. Hearrington (2009) also found mixed results, with students improving in their skills overall, but still feeling frustrated. Students in Jarmon et al. (2008) also indicated that their group project in Second Life increased their learning.

Overall, over the course of the semester students became more familiar and comfortable with using Second Life and virtual worlds. For many, their operational skills inside the virtual environment improved as students completed more complex tasks. Still, a third of the students were unsure about their abilities in Second Life, and that they were not completely prepared after the completion of the course.

Research Question Four:

Do undergraduate pre-service teachers believe that Second Life is a viable educational tool/environment?

Students believed that Second Life or a virtual world was a viable educational tool or environment. Based upon LiveJournal reflections and focus group sessions, most students believed that Second Life or a virtual world was a viable educational tool, with notable exceptions. During the focus group sessions, two students directly stated that virtual worlds were not viable educational environments, perhaps because they could not visualize how they would use it in elementary classroom context with young children. One pre-service teacher spoke for
his/her building group when he/she said “We feel collectively that this would better be suited if the ‘mature content’ was at a place where if a student was accessing this at a school, it would not be found and could not come up in a search.” Indeed, whether ‘PG’ was selected in the search or not, inappropriate content such as nudity would often appear. Throughout the LiveJournal reflections, a few students thought that virtual worlds were not educational environments, and one student did not take them seriously (FitzGibbon et al., 2008; Lambert et al., 2008). It is possible that students did not see virtual worlds as educational environments because they viewed it more as a game, and did not view games as being educational. However, such opinions were the minority, as most students believed that either Second Life or other virtual environments could be used in educational contexts, although usually in secondary education contexts. Nine out of ten students in focus group sessions agreed that using Second Life or other virtual environments could help them prepare for teaching.

Despite trepidation, all but two students successfully participated in the virtual parent-teacher conference. Further, although some students indicated low comfort with Second Life after completing the group building activity, all students participated and created something tangible inside Second Life. Time and again students collaborated with each other both inside and outside of Second Life.

Research Question Five:

How confident/comfortable do undergraduate pre-service teachers feel about using virtual worlds and other digital technologies?

Finding 5.1. Both before and after taking the course, students indicated that they were very proficient in using various types of “everyday use technologies.” Students consistently indicated confidence in navigating the Web, searching for information on the Internet, using e-
mail and web-based course management systems, using programs such as Microsoft Word and PowerPoint, in operating digital cameras, and in maintaining social network accounts such as Facebook or Myspace. In short, students know how to use these common types of technologies, possibly because they use them often.

**Finding 5.2.** After completing the course, the biggest change in proficiency came with using newer Web 2.0 technologies such as blogs, wikis, and virtual worlds. The general trend for all technologies in this section from the beginning of the course to the end of the course was upward, from “Beginner” to “Expert.” This trend was especially pronounced with Twitter, Second Life, LiveJournal, and SurveyMonkey. For example, before the course thirty-one students had no experience with Second Life, and after the course eighteen students indicated they were beginners and fourteen students indicated moderate experience. The changes occurred largely because these tools were presented to students during the TE 260 course, and students were required to learn them and use them to complete assignments.

**Finding 5.3.** According to LiveJournal entries, only 21 (55%) out of 38 students believed that after completing the course they were prepared to use Second Life or virtual worlds either to teach or for recreational purposes. However, a few of these students were still not entirely comfortable using virtual worlds in the future, and wanted more time and practice with it. Therefore, there was a difference between preparation and comfort. While students thought they were largely prepared to use virtual worlds after taking the course, they were not necessarily more comfortable or confident in their ability to do so. The findings echo student reluctance to use virtual worlds or to see virtual worlds as educational environments (FitzGibbon et al., 2008; Jarmon et al., 2008; Lambert et al., 2008; Vogel et al., 2008.) Two students believed strongly that they were not prepared to use Second Life or virtual worlds in any context, and one student
stated outright that they would never use virtual worlds in an educational context. Face-to-face methods were preferred instead.

Finding 5.4. An overwhelming percentage of pre-service teachers in the study did not feel comfortable or confident enough to use either Second Life or another virtual environment in a classroom setting. Focus group sessions supported the LiveJournal findings, with six out of ten students saying that they were comfortable enough to use Second Life or virtual worlds as a teacher, but they were not necessarily sure about doing it. One student specifically expressed a lack of confidence. Survey results supported focus group session and LiveJournal responses, with only ten (26%) students saying they were comfortable enough to use Second Life with future students. Additionally, only seven (18%) students said they were comfortable using virtual worlds in general with future students, supporting Lei (2009). Ultimately, while students successfully completed the virtual world activities in Second Life, and they believed they had been prepared to use virtual worlds, they were overall not sure about using them in educational contexts.

Conclusions

The study began with the question, Are undergraduate pre-service teachers who participate in a virtual Web 2.0 experience sufficiently prepared to function in a virtual world? Further, the study was explored from the point of view of students as digital natives, since few studies have examined pre-service teachers as digital natives (Lei, 2009). Educators have previously assumed that since current undergraduate students are digital natives and they have grown up using digital technologies, they should feel comfortable using these digital technologies for personal and educational purposes, but this assumption is not necessarily accurate. To answer these questions, students were asked a series of questions both before and
after the course, and both before and after completing the virtual world activities designed for the course.

Current pre-service teachers (digital natives) are overwhelmingly comfortable and confident in their ability to use technology. Students indicated strongly that computers were reliable, that they were interested in learning and using technology, and that they were confident in using technology to learn and to teach (see Table 25). Although percentages remained high with items in Table 25, a dependent samples $t$-test showed there was a significant decrease in student comfort and confidence in using technologies from before the course to after the course. For example, student interest in learning new technologies dropped from 95% before the course to 87% after the course. Again, student comfort in using technology to create media products dropped from 92% before the course to 82% after the course, representing the largest decrease. Such declines in student level of comfort and confidence in using technology could have been caused by their mixed experiences while learning to use virtual worlds. Creating a media product with a virtual world is also somewhat different than creating a product using traditional desktop publishing tools.
Further, pre-service teachers (digital natives) are overwhelmingly confident in their proficiency level in using “everyday” technologies. Pre-service teachers held very high beliefs in their level of proficiency in using “everyday” technologies both before and after the course (see
Table 26. These technologies included searching for information on the Web, using programs such as Microsoft Word and PowerPoint, using course management software, maintaining social networks, and using digital cameras. Students’ perceived proficiency in these areas changed little from the beginning of the course to the end of the course, with most students either indicating “Substantial Experience” or “Expert.”

Table 26

**Pre-service Teachers’ Perceived Level of Proficiency in Using “Everyday” Technologies**

<table>
<thead>
<tr>
<th>“Everyday” Technology Tool or Activity</th>
<th>Substantial</th>
<th>Expert</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Navigating the Web</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Finding information in Web searches</td>
<td>45%</td>
<td>55%</td>
</tr>
<tr>
<td>Using email</td>
<td>32%</td>
<td>24%</td>
</tr>
<tr>
<td>Using Web-Based course management software (i.e. E-Learning, Blackboard, etc.)</td>
<td>47%</td>
<td>50%</td>
</tr>
<tr>
<td>Maintaining a personal social networking site (i.e. Facebook, MySpace, etc.)</td>
<td>34%</td>
<td>32%</td>
</tr>
<tr>
<td>Desktop publishing (using Microsoft Word)</td>
<td>29%</td>
<td>42%</td>
</tr>
<tr>
<td>Using presentation software (such as Microsoft PowerPoint)</td>
<td>50%</td>
<td>55%</td>
</tr>
<tr>
<td>Using a digital camera</td>
<td>29%</td>
<td>24%</td>
</tr>
</tbody>
</table>

Such confidence could come from the fact that students have been using computers for most of their lives, and are indeed digital natives. All but four students have been using computers and the Internet since grades Pre-K to grade 5. Approximately 60% of students spend between 2 – 4 hours per day on a computer, and 10% spend more than four hours per day online.
Additionally, 45% of students indicated that their top reason for using the Internet was for social networking such as Facebook or Myspace. Another 60% of students indicated that using the Internet to complete coursework was the one of the top two reasons they use the Internet. In other words, students spend most of their time online both socializing and working on assignments.

On the surface it would seem that the assumption that these pre-service teachers who are digital natives are comfortable and confident in using Web 2.0 technologies is correct. However, the introduction of Second Life to the course muddied the picture. Therefore, even though pre-service teachers were comfortable and confident in their ability to use technology, they still experienced several problems and frustrations, both initially and at the end of the course. No student had previously used Second Life, either for personal or educational reasons, and when first introduced the initial student reaction to Second Life was mixed. Some thought it looked “fun,” others that it was “weird” or “creepy.”

Students became frustrated for several reasons, many related to Second Life’s interface. They had difficulty in moving their avatar (though at the end most said it was easy on the Virtual World Experiences survey), editing their avatar’s appearance, and in communicating with classmates. The communication problem is surprising since Second Life employs a text chat feature similar to those found in cell phones, instant messaging, and social networks. No student discovered the voice chat feature that Second Life provides. Communication was such a big problem that students working on the group-building project completed their project in person in the computer lab. In this way, students could speak directly to their group members sitting next to them. By the end of the course, no student indicated that communicating in Second Life was easy.
Eighteen students indicated that activity two (completing tasks) was easy, and another six said it was “not too difficult.” Most students successfully completed tasks on their own, but some enlisted the help of fellow classmates. Still, a few students had problems searching for items, acquiring items, and taking pictures inside Second Life. By the time of the third activity (parent-teacher virtual conference role-play), a shift finally began to emerge; most indicated that their overall operating skills inside Second Life had improved and many thought that they were prepared to operate inside Second Life. However, almost all students still preferred face-to-face interactions to virtual ones. After completing the fourth and final activity (group building project), 21 students believed that completing all of the activities had prepared them to use Second Life or other virtual worlds in educational or recreational contexts. Despite feeling prepared, many still believed that they needed more time and practice and were not completely confident about using Second Life or virtual worlds as a teacher.

All of this circles back to the original question, *Are undergraduate pre-service teachers who participate in a virtual Web 2.0 experience sufficiently prepared to function in a virtual world?* The answer is neither “yes” nor “no” and can be answered on two levels. First, pre-service teachers indicated by their performance on tasks that they are prepared to function in a virtual world. Every pre-service teacher completed Second Life activity one, two and four, and all but two pre-service teachers completed Second Life activity three (parent-teacher conference). Responses from surveys, LiveJournal posts, and focus group sessions all agree that many pre-service teachers believed they are prepared to function in a virtual world. Second, although pre-service teachers believed that they are prepared to function in a virtual world, they are not necessarily comfortable or confident in doing so. Even after completing all Second Life activities throughout the course, students both prepared and unprepared displayed a level of
uneasiness about Second Life and virtual worlds. Therefore, while many students could operate inside of virtual worlds, they are not necessarily confident in their ability to operate inside one or in using one to teach students.

According to data in this study, Lei’s (2009) assertion that digital natives may not be comfortable or confident in using digital technologies is proved correct. Initially, pre-service teachers exhibited an overwhelming degree of confidence and comfort in using computers and the Internet, and “everyday” use technologies such as e-mail, Microsoft Word, and digital cameras. Introducing virtual worlds changed the situation considerably. Pre-service teachers in this study were prepared to use virtual worlds operationally despite their frustrations and annoyances associated with the interface, but they were not altogether comfortable or confident in either their ability to operate or use Second Life to teach students. Survey results showed that only ten (26%) students were comfortable enough to use Second Life with future students, and only seven students (18%) were comfortable using virtual worlds in general with future students. Therefore, educators should not automatically assume that because today’s students are digital natives that they are confident in using all types of digital technologies (Lei, 2009).

Many pre-service teachers consider Second Life a game, with both positive and negative connotations. Those pre-service teachers viewing it positively compared Second Life to “The Sims,” a virtual game played on consoles and PCs. Students today are familiar with gaming, in one form or another. Some pre-service teachers viewed the “game” negatively. Keren-Kolb (2010) found that there is a disconnect between technology tools pre-service teachers use in their daily lives and those tools they view as appropriate tools for classroom instruction. Research suggests that beliefs are formed from life experiences (Nespor, 1987), and therefore pre-service teacher opinion about Second Life could be influenced by frequent reports on abuses of Web 2.0
tools by the media (Keren-Kolb, 2010). Second Life has been in the news for negative reasons such as pedophilia (Riley, 2007) and infidelity and divorce (Green, 2008). Indeed, one pre-service teacher commented that they had “recently watched an episode of Law and Order: SVU and some girl was killed by a predator on a site like” Second Life. Therefore, educators attempting to use Second Life and gaming for instructional purposes should confront these negative perceptions.

Pre-service teachers confirmed findings from previous studies concerning barriers to using Second Life. Students experienced interface issues throughout the course (Jarmon et al., 2008; Luo et al., 2008; McKay et al., 2008; McVey, 2008; Sanchez, 2009; Schultze et al., 2008). Pre-service teachers indicated that distraction and exposure to inappropriate content would prevent them from using Second Life (Chow et al., 2007; Luo et al., 2008; Hayes, 2006; McKay et al., 2008). They indicated that student reluctance to accept Second Life as an educational tool would prevent them from using Second Life (FitzGibbon et al., 2008; Jarmon et al., 2008; Lambert et al., 2008; Vogel et al., 2008). They also indicated that technical issues related to software and hardware would act as a barrier (Chow et al., 2007; Franklin et al., 2007; Luo et al., 2008; Sanchez, 2009; Schultze et al., 2008). Pre-service teachers will continue to be reluctant to use Second Life or other virtual environments until these issues are addressed.

Second Life and virtual worlds can be used both as a Web 2.0 tool and to address 21st century skills in higher education settings as found in several studies mentioned in the literature review in Chapter II. From the Web 2.0 perspective, activity three (parent-teacher virtual conference) and activity four (group building project) were both “bottom-up” student-centered activities that allowed students to create content. In activity three, students worked in pairs to create an authentic parent-teacher conference. Students enjoyed the role-play activity, supporting
the findings of Mayrath et al. (2007) and Gao (2008). In activity four, students worked in groups to negotiate and build an object or series of objects connected either to the course or to the field of education. Although contrary to previous findings (Mayrath et al., 2007), most students enjoyed the group building activity because it was connected to course content and students enjoyed working with team members. While completing activities students were using 21st century skills such as finding and assessing information, collaboration and communication, leadership skills, and creativity. Additionally, pre-service teachers indicated in survey responses that they believed Second Life and virtual worlds could be used to address several 21st century skills.

If the hallmark of Web 2.0 is “bottom-up” student-centered activity, certainly Second Life or other virtual worlds can act as a Web 2.0 tool and facilitate the learning of 21st century skills. In activity three (parent-teacher virtual conference), students were provided only with the roles they were supposed to play. Each group was responsible for conducting the conference seriously, carrying out the conference as though it was a parent-teacher conference occurring in real life (skills: collaboration and communication). To this end, it was the responsibility of each student to expound upon and extend the roles they were given to act and to truly create their character (skill: creativity). Students were required to create the names of parents, teachers, and the child/student. Teachers were required to explain the specified problem to the parent, and to offer possible explanations and solutions to the problem. Conversely, parents had to explain any possible factors, which may have been unknown to the teacher (i.e. learning disability, problems at home, etc.) and to also offer suggestions on how the teacher could help the parent and child. These actions encouraged students to seek out possible answers from course material or other sources (skills: access and evaluate information, and use and manage information).
In activity four (group building project), students were given a wide set of parameters to guide them (see Figures 1 and 2). Each group was instructed to create either an object or series of objects that were either directly connected to course content or to the field of education. Therefore, students had the option of either working independently to create their own object, or to work together to create a larger object. Most students collaborated together with group members both inside Second Life and with each other in the computer lab (skills: collaboration, communication, and creativity). While they were building, they were also trying to understand how best to manipulate Second Life building tools to create their design (skills: problem solving and media product creation). Most students took the initiative to actively build different parts of their creation (skills: leadership and responsibility). As they completed their project, students also used 21st century skills such as flexibility and adaptability when encountering building problems and productivity and accountability in meeting with group members and reaching deadlines.

Figure 1. Group Building Project (Solar System Diorama) in Progress
The study had several limitations that should be considered. First, the study has a small sample size, with 38 participants. Small sample sizes impact any statistical calculations conducted. Second, the sample is a convenience sample taken from two sections of TE 260 from one university located in the Southeastern United States. Third, only traditional undergraduate pre-service teachers in physical education, elementary education, and special education were included in the sample, since secondary education students are not required to complete TE 260. Fourth, even though the instructor did not carry out the apparatus of the study (surveys, LiveJournal post collections, focus group sessions), it is possible that students were unduly influenced to contribute answers which they believed the instructor would find favorable. Fifth, students learned to use only one virtual environment, Second Life. Student experiences with other virtual environments may encourage different opinions. Despite these limitations, it is believed that the results of the study will help educators understand how traditional undergraduate pre-service teachers think about and approach the use of virtual worlds, as well as the degree of comfort and confidence they have when dealing with technology. The study also confirms findings from previous studies in regards to barriers to using Second Life, and for potential uses of Second Life in educational contexts. Finally, the study also provides insight into how students view the possible future uses of virtual worlds in education, how the uses
correspond to 21st century skills, and potentially how educators and researchers can take advantage of this opportunity.

Recommendations

The identified findings reported from the study have led to recommendations aimed at assisting educators in the implementation and use of virtual worlds in education. Recommendations for further research are also suggested.

Recommendations for Practice

Recommendation One. Based upon findings from this study and from literature reviewed in Chapter II, K-12 teachers interested in having students learn inside a virtual world should consider either using a virtual world other than Second Life, or using Teen Second Life for students age 13 to 17. Second Life’s search function allows any user to locate people (avatars), places, and things inside the virtual world. It also includes a “PG” function whereby checking the “PG” box should theoretically return only “PG” rated content during searches. However, such searches often returned mature content, either directly in the search results or on the island after teleporting. Several students complained that they were confronted with inappropriate content such as nudity during the searches, and were fearful of any potential student also confronting such material.

Pre-service teachers also expressed concerns about the security features of Second Life. Second Life is restricted to users age 18 and up, and is therefore an arena for adults. One of the parent-teacher conferences held during activity three was interrupted by an outside avatar that proceeded to text inappropriate remarks, and several pre-service teachers were concerned about such incidents occurring with their future K-12 students.
Teen Second Life offers a safer environment for students age 13 to 17. Access is restricted, and educators must undergo a rigorous screening process to gain entry. Once entry is obtained, all adults are confined to widely identified portions of the virtual world; they cannot leave these areas but students may visit and leave at any time. Therefore, any educator interested in students completing projects inside a virtual environment should consider Teen Second Life. Additionally, any student under the age of 18 operating in Second Life violates the Terms of Service (Second Life, 2010).

**Recommendation Two.** Educators in higher education considering using Second Life or other virtual worlds in instruction should make the virtual environment a central component of the course. Because one of the goals of TE 260 is to teach pre-service teachers how to use a number of Web 2.0 tools, the concept of virtual worlds and Second Life were taught to pre-service teachers in the context of “one of many” Web 2.0 tools. Such an approach prevented the instructor from providing intensive, sustained instruction. Instead, students were introduced to the concept, taught how to use Second Life, instructed in how to complete the assignments and then moved to the next concept and Web 2.0 tool. Focus group sessions showed that students wanted more sustained, long-term instruction. One student mentioned offering an entire class on Second Life, or requiring weekly assignments. Another student also mentioned completing “mini-assignments” each week. Yet another student suggested holding actual class meetings in Second Life called “Meet me at the Sandbox.”

**Recommendation Three.** Related to recommendation two, educators should not automatically assume that current pre-service teachers who are also digital natives feel comfortable and confident in using all types of digital technologies. As the study showed, pre-service teachers are confident in using technology overall and in using certain “everyday” use
technologies but this does not mean that they will automatically feel confident in using all technologies such as virtual worlds. In fact, of the many students who said in their LiveJournal entries that they were prepared to use Second Life or virtual worlds, a large number also expressed a lack of confidence or degree of hesitation in actually using virtual worlds with future students. Instructors should take the proper amount of time and instruction in preparing students to use digital technologies, both operationally and in the context of actually implementing them into instruction.

Recommendations for Future Research

**Recommendation One.** The current study should be replicated with new students in the same course, thus increasing the sample size. Increasing the sample size would allow for more in-depth statistical calculations such as t-test, ANOVA, chi-squares, and factor analysis which could bring more statistically significant conclusions. A larger sample size may indeed identify some differences in the way pre-service teachers perceive virtual worlds. Keren-Kolb (2010) postulates that younger students who grew up with the *Children’s Internet Protection Act of 2001* (CIPA, 2001) may feel more negatively towards everyday technology tools since they were forced to sign school acceptable use agreements restricting the use of cell phones and social networking sites in school settings. Older students who used the same technologies did not sign such agreements, and may be more favorable to technology in school settings. It is possible that this effect could influence the way pre-service teachers view virtual worlds.

**Recommendation Two.** Given that this study did not include secondary pre-service teachers, a study should be conducted with pre-service teachers in secondary education to determine any differences or similarities with pre-service teachers in elementary education, physical education, and special education. Given that pre-service teachers in elementary
education and special education must teach a variety of subjects, whereas secondary pre-service teachers only teach one or two subjects, they could view virtual worlds in very different ways. It is interesting to note that most pre-service teachers did not feel that Second Life or virtual worlds could specifically be used in elementary education, although a few did. Instead, they believed that virtual worlds could be used in secondary education and higher education. Exploring secondary education majors’ views would therefore be beneficial.

**Recommendation Three.** The study also did not include graduate students. It would therefore be beneficial to explore how graduate students would respond to virtual worlds. Given that graduate students are older than typical undergraduate students and have potentially had more life and school experiences than undergraduate students, it is possible that developmental differences could appear. Graduate students in the fields of education should be studied, as well as graduate students in other fields of study.

**Recommendation Four.** Changes could also be made to the design of the study. Research could be conducted using two different virtual environments such as Second Life and Active Worlds, with two different groups each exploring one of the environments. Using two different environments may shape the way students view virtual worlds in potentially different ways. Another design change could be to have one set of students use Teen Second Life, with the other set continuing to use Second Life. Teen Second Life is similar to Second Life, but is restricted to teens age 13 to 17. Adult educators can enter Teen Second Life only after passing a screening process, and they must stay in specified, restricted areas of the world once inside. Therefore, one set of students could work hands-on with students in Teen Second Life to create games such as those created in Franklin et al. (2007).
Recommendation Five. Another recommendation is based upon how assignments were structured and deployed. During the study, students were given the option to meet with each other in the same computer lab. During the virtual parent-teacher conferences, most students were observed sitting side by side in the same computer lab. Likewise, students met with each other in the same computer lab while completing their group building project. Students were often observed eschewing the communication tools available in Second Life in favor of communicating face to face in the computer lab, especially during the group building project. Therefore, a change in the assignment structure would be to require students to use two or more different labs, thereby ensuring that students used the virtual world’s communication tools. Such a design change could potentially impact student opinions about communicating in a virtual world.

Recommendation Six. Another avenue of research concerns the way the Second Life activities were deployed. Second Life and the concept of virtual worlds were introduced to students in a Technology in Education (TE) course. As such, Second Life was but one of many tools that pre-service teachers were required to practice and learn during the course. Therefore, a significant change would be to center an entire course on Second Life or another virtual world, thus integrating the course and the virtual world. As one student said in the focus group session at the end of the course,

This is one of those ideas that you could literally offer a class unto itself, like a three-hour class on itself at [Large University] and next time they do this they need to introduce this in the first week, and LiveJournal is cool and all, but do it weekly in Second Life so you get used to going in there and get used to doing stuff, and that way you don’t have a month to do all this stuff.
Instead of being one of many tools learned during the course, Second Life or another virtual world could be used to facilitate the deployment of the course and the learning of other digital tools.

Final Comments

As stated in Chapter II, society in the United States has transitioned from an industrial society in the 1980s to the knowledge society of the 1990s and moving forward (Resnick, 2002). With this transition has come the call in some circles for the need for students to learn 21st century skills such as problem solving, critical thinking, communication and collaboration, creativity, and innovation, all supported by technology and within core curriculum (Partnership for 21st Century Schools, 2009; Peirce, 2008). President Obama also has promised to deliver a “21st Century education that will prepare children for success in the new global workplace,” promote “world-class academic standards and a curriculum that fosters critical thinking, problem solving, and the innovative use of knowledge to prepare students for college and career (Whitehouse.gov, 2010, ¶8).”

Since these skills are viewed as so vitally important, it is important for pre-service teachers to know them because they will be the conduit through which these skills will pass to future citizens. It is also important to recognize the reality that we do live in an increasingly digital age filled with cell phones, iPads, video games, and social networks. Today’s students, dubbed “digital natives,” use these technologies every day and such tools are an integral part of their lives. Teens multi-task without missing a beat, and it would not be uncommon to see one working on homework, downloading music from the Internet, text messaging on a cell phone, and playing with an iPad all at the same time (Rideout, Foehr, & Roberts, 2010). Future digital natives will see technology integrate more into their lives, not less (Rideout et al., 2010).
Current pre-service teachers are also digital natives. But as Lei (2009) suggested and this study supports, they are not necessarily comfortable or confident in using all types of digital technologies, which takes us to virtual worlds. Certainly, as this study supports, pre-service teachers were prepared to use virtual worlds, but many were hesitant or uneasy about using them in educational contexts. Virtual worlds, in one form or another, are unlikely to disappear for the foreseeable future. The question will not be whether virtual worlds will continue to exist, but rather, what will they look like. Already they are changing. The Nintendo Wii video game system incorporates an avatar, created by the user, which represents the user while playing specific games. The user or player manipulates a handheld remote control to move the avatar. Recently, at the Electronic Entertainment Expo (E3) Microsoft unveiled X-box 360 Kinect, a new system that does the same thing as Nintendo Wii, *without* the remote. Instead, Kinect uses two motion control cameras to capture the movement of the player, and the player’s own motion in real life controls the motion of the avatar in the game. Imagine if Second Life or another virtual environment which could be used in educational contexts and settings incorporated an interface such as Kinect?

Given that kids are involved in virtual worlds and gaming, it is important that pre-service teachers are taught about virtual worlds and gaming, whether they use them in the classroom or not. Going back to the end-of-course focus group session, the following remarks were made by two students when asked “Are your future students doing this (virtual worlds)?”

Student 4—“I’m sure they will.”

Student 5—“And if you don’t think so, try playing a 5 or 6 year old kid in a video game.”

Student 4—“Technology is more prominent at a younger age. And especially in the classroom, you don’t want your children to be behind in technology because you’re not teaching them technology or using it in the classroom. You want them to stay up to date on the newest technology. Cause if you don’t they won’t know what to do…”
We should keep in mind that our current pre-service teachers will be our future teachers. They will be responsible for educating students not only about content, but also about problem solving, critical thinking, collaboration, communication, and creativity. They will be the front line in teaching children how to properly use digital technologies in ways that are both appropriate and safe. As such, educators should continue to research virtual worlds and gaming, and continue to instruct and inform pre-service teachers about how best to use them.
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APPENDICES
Appendix A

Appendix E

Informed Consent Form
Technology Use Survey
Alan Brown

Dear Potential Participant:

You are being asked to participate in a research project exploring student experiences as they learn how to use the digital Web 2.0 tool Second Life. All participants must be age 19 years and up. If you agree to participate in the study, you are agreeing to do the following:

1. Complete the enclosed Pre-Survey (Technology Use Survey) which will take approximately 5 to 10 minutes to complete.
2. Complete a Second Life Experiences Survey at the end of the course, which will take approximately 5 to 10 minutes to complete.
3. Complete a Post-Survey (Technology Use Survey) at the end of the course, which will take approximately 5 to 10 minutes to complete.
4. Be willing to be randomly selected to be part of a 5 to 7 person focus group to be held at the end of the course. The focus group session will give you the chance to talk about your Second Life activities assignments you complete in CAT 250.

The two Technology Use Surveys (pre-survey and post-survey) ask demographic questions (age, year of study, major), and items asking for your opinion on how comfortable and confident you feel in using digital technologies. The Second Life Survey asks demographic questions, and questions about your experiences in completing the Second Life activities in the course. Once all data have been collected and analyzed, the surveys will be destroyed. Focus group recordings will be destroyed when the study concludes. At the conclusion of the pre-survey you will also be given an opportunity to include your LivJournal posts in the study as well. If you decide not to have your LivJournal posts included, you can still participate in the surveys and the focus group.

You can opt out of the study at any time during the semester. If you decide to participate, you can later decide to drop out of the study. There are no known risks or discomforts involved. To assure anonymity of responses, I am asking that you not provide your name on this survey or on any of the following surveys. Your survey responses will be randomly assigned a number so that I can compare responses provided on the pre and post surveys. While participation in this research will provide no direct benefit to you other than learning how to use Second Life, the knowledge gained will benefit all educators who are trying to understand student experiences inside virtual worlds such as Second Life.

By signing your name at the bottom of the form and by completing the enclosed survey, you are consenting to be a research participant. Remember, you may drop out of the study at any time. If you have any questions about this study, you may contact me, Alan Brown at 334-681-
1510 or mbrown4050@hotmail.com. You may also contact the faculty advisor associated with this project, Dr. Vivian H. Wright, at 205-348-1401 or vvright@bamaed.ua.edu. If you have any questions about your rights as a research participant, you may contact the Research Compliance Office at The University of Alabama at 205-348-8461, or toll free at 1-877-820-3066, or by emailing rscompliance@fa.ua.edu.

Thank you in advance for your participation.

__________________________  ______________________
Name/Signature              Date

UNIVERSITY OF ALABAMA IRB  
CONSENT FORM APPROVED: 12/3/2009
EXPIRATION DATE: 12/2/2010
Appendix B

Response from Dr. Lei received on Wednesday, November 11, 2009, 9:23 am.
Dear Chris,

Thanks for your interest in my research. You are welcome to use my survey and adapt it for your own study. Your research topic sounds very interesting. I’d love to learn what you find out. Best wishes with your studies.

Jing

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Jing Lei, Ph.D.
Assistant Professor
Instructional Design, Development and Evaluation
School of Education, Syracuse University
336 Huntington Hall,
Syracuse, NY 13244
Phone: (315)443-1362
Fax: (315)443-1218
Email: jlei@syr.edu

On 11/10/09 2:27 PM, "Christopher Inman" <inman001@crimson.ua.edu> wrote:
Dear Dr. Jing Lei,

First, let me introduce myself. My name is Chris Inman, and I am a doctoral candidate at the [Large University] pursuing a Ph.D. in Instructional Leadership with a focus in Instructional Technology. I am currently writing my dissertation which looks at preservice teachers as digital natives learning how to use Second Life. I came across your research article titled "Digital natives as preservice teachers: What technology preparation is needed?" in the Spring 2009 (Vol. 25, No.3) edition of Journal of Computing in Teacher Education. I enjoyed reading your article, and I liked your survey as well. I was hoping that, with your permission, I might be able to adapt your survey for my dissertation. Of course, you would receive proper credit in my dissertation for allowing me to adopt/adapt your survey. I was also curious about what you did for reliability/validity of the instrument? I see on p.89 where you discuss using a panel of experts to rate the difficulty level of the technologies.

I really look forward to hearing from you and I hope you will sincerely consider my request. Thank you for your time and consideration.

Sincerely,

Christopher T. Inman
Doctoral Candidate
The University of Alabama
CAT 250 Instructor
Appendix C

Random Student Number ______

Technology Use Pre-Survey
(Pre-Survey)

Directions: This survey is anonymous. You must be age 19 years and up to complete this survey. Please DO NOT write your real name on this survey, and please answer all questions in the survey. Once survey data have been recorded, all surveys will be destroyed. Below is a list of questions which ask students about comfort and confidence in using digital technologies. Read each one carefully and circle/underline the answers that best describe you or your opinion. Please remember that there are no correct or incorrect answers. Thank you for taking the time to answer the questions.

Demographics

1. Gender:
   A. Female         B. Male

2. When did you start using a computer?
   A. Before Kindergarten
   B. In Kindergarten to Grade 3
   In grade 4-5
   In grade 6-8
   In grade 9-12
   After grade 12

3. How much time do you spend on computers every day?
   Never
   Less than one hour
   About 1-2 hours
   About 2-3 hours
   About 3-4 hours
   More than 4 hours

4. What is your major?
   Elementary Education
   Special Education
   Physical Education
   Secondary Education
   Other ____________________

152
5. What is your age?
   19-20
   21-22
   23-24
   25-26
   Other

6. What is your level of educational classification?
   Freshman
   Sophomore
   Junior
   Senior
   Graduate
   Other

7. Overall, on which task do you spend the most time while using the Internet? *(Choose the top 5; place a “1” beside the top choice in which you spend the most time, a “2” beside the second choice in which you spend the second most time, a “3” beside the third choice in which you spent the third most time, a “4” beside your fourth choice, and a “5” beside your fifth choice.)*
   a. Working on course/class assignments
   b. Searching for information for practical purposes (e.g. health, weather, etc.)
   c. Reading news to know what’s going on.
   d. Email (sending and receiving it)
   e. Playing games
   f. Online Chatting (Chat Rooms, Instant Messenger, Skype, etc.)
   g. Surfing the net for fun (reading novels, stories, entertainment)
   h. Downloading music, pictures, movies, etc.
   i. Blogging
   j. Viewing or publishing digital media files (e.g. on YouTube, Podcasting, etc.)
   k. Social Networking (Facebook, Myspace, etc.)
   l. Shopping
   m. Getting information about other places, countries, and cultures
   n. Viewing/Posting messages (e.g. on forums, message boards, discussion boards)
Section 1: Confidence/Comfort with Using Technology

How would you describe your comfort and confidence level with using technology? Please circle the best response. Responses include Strongly Disagree (SD), Disagree (D), Somewhat Disagree (SWD), Somewhat Agree (SWA), Agree (A), and Strongly Agree (SA).

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

8. Computers are reliable.
SD  D  SWD  SWA  A  SA

9. The more technology you use, the more respect you get from your peers.
SD  D  SWD  SWA  A  SA

10. I feel comfortable using technology.
SD  D  SWD  SWA  A  SA

11. Computers and related technologies isolate students from one another.
SD  D  SWD  SWA  A  SA

12. I am interested in computers and related technologies.
SD  D  SWD  SWA  A  SA

13. I am interested in learning new technologies.
SD  D  SWD  SWA  A  SA

14. I am interested in learning new technologies that will help my teaching in the future.
SD  D  SWD  SWA  A  SA

15. I believe that technologies can help me teach better.
SD  D  SWD  SWA  A  SA

16. I believe that technologies can help my students learn better.
SD  D  SWD  SWA  A  SA

17. I can solve most of the problems when my computer does not work.
SD  D  SWD  SWA  A  SA

18. I am confident in using technology in my learning.
SD  D  SWD  SWA  A  SA

19. I am confident in using technology to teach.
SD  D  SWD  SWA  A  SA
20. I feel comfortable using the Internet to shop.
SD   D   SWD  SWA   A   SA

21. Sometimes technology can be a distraction.
SD   D   SWD  SWA   A   SA

22. I feel comfortable using the Internet to communicate with people.
SD   D   SWD  SWA   A   SA

23. I feel comfortable using technology to collaborate with people.
SD   D   SWD  SWA   A   SA

24. I feel comfortable using digital technologies to complete homework.
SD   D   SWD  SWA   A   SA

25. I feel comfortable using technologies to create products.
SD   D   SWD  SWA   A   SA

Section 2: Skill Proficiency
How would you describe your proficiency in the following skills? Please circle the best response:

26. Navigating the Web
No Experience  Beginner  Moderate  Substantial  Expert

27. Finding information in Web searches
No Experience  Beginner  Moderate  Substantial  Expert

28. Using email
No Experience  Beginner  Moderate  Substantial  Expert

29. Using Web-Based course management software (i.e. E-Learning, Blackboard, etc.)
No Experience  Beginner  Moderate  Substantial  Expert

30. Maintaining a personal social networking site (i.e. Facebook, MySpace, etc.)
No Experience  Beginner  Moderate  Substantial  Expert

31. Blogging
No Experience  Beginner  Moderate  Substantial  Expert

32. Developing a wiki
No Experience  Beginner  Moderate  Substantial  Expert
| 33. Using Twitter | No Experience | Beginner | Moderate | Substantial | Expert |
| 34. Using Gmail | No Experience | Beginner | Moderate | Substantial | Expert |
| 35. Using Second Life | No Experience | Beginner | Moderate | Substantial | Expert |
| 36. Using LiveJournal | No Experience | Beginner | Moderate | Substantial | Expert |
| 37. Using Survey Monkey | No Experience | Beginner | Moderate | Substantial | Expert |
| 38. Desktop publishing (using Microsoft Word) | No Experience | Beginner | Moderate | Substantial | Expert |
| 39. Using presentation software (such as Microsoft PowerPoint) | No Experience | Beginner | Moderate | Substantial | Expert |
| 40. Using a digital camera | No Experience | Beginner | Moderate | Substantial | Expert |
| 41. Using a Smart Board | No Experience | Beginner | Moderate | Substantial | Expert |
| 42. Using assistive technologies to help students with disabilities learn | No Experience | Beginner | Moderate | Substantial | Expert |
| 43. Playing video games | No Experience | Beginner | Moderate | Substantial | Expert |
| 44. Exploring new technology | No Experience | Beginner | Moderate | Substantial | Expert |
| 45. Troubleshooting software problems | No Experience | Beginner | Moderate | Substantial | Expert |
| 46. Troubleshooting hardware problems | No Experience | Beginner | Moderate | Substantial | Expert |

Thank you for participating in the survey! Your help is very much appreciated!
Appendix D
Second Life Activity Two
Series of Tasks

Checklist

___ Student located Education Hall 1 and took picture of avatar in front of Education Hall 1
___ Student located the Large Clock Tower on the island and took picture of avatar in front of Large Clock Tower
___ Student’s avatar was flying in the Large Clock Tower picture
___ Student found Large University’s Arts & Sciences Island
___ Student found school mascot on Arts & Sciences Island and took picture of avatar with mascot
___ Student located free clothing somewhere in Second Life and took picture of avatar with free clothes
___ Student’s avatar was wearing the free clothes
___ All pictures were emailed to the instructor
___ Student’s avatar was facing the camera in the pictures
Appendix E

Second Life Activity Three
Virtual Parent-Teacher Conference Role-Play

Checklist

___ Student came to campus to use computer lab
___ Student did not come to campus, and used own computer
___ Avatar arrived at designated location on time
___ Avatar is dressed appropriately/professionally
___ Communication: Voice Chat or Text Chat?
___ Preparation: Student prepared for role-play before the activity
___ Creativity: Student completed an authentic parent/teacher conference
___ Assistance in helping avatar sit down?
___ Technical Problems?
___ Interruptions occurred?
Appendix F

Second Life Activity Four
Group Building Project

Checklist

___ Collaboration: Group successfully worked together and created an object or series of objects

___ Creativity: Degree of creativity involved in object creation

___ Communication: How did students communicate during project

___ Presentation: Group presented object to class and explained creation process (why the objects were chosen)

___ Each student collaborated and participated in the design and building process
Appendix G

Random student number ______

Virtual World Experiences Survey

Directions: This survey is anonymous. You must be age 19 years and up to complete this survey. Please DO NOT write your real name on this survey, and please answer all questions in the survey. Once survey data have been recorded, all surveys will be destroyed. Below is a list of questions which ask students about your experiences in completing the Second Life activities in the course. Read each one carefully and circle/underline the answers that best describe you or your opinion. Please remember that there are no correct or incorrect answers. Thank you for taking the time to answer the questions.

Demographics

1. I used Second Life before taking this course.
   A. Yes
   B. No

2. I had heard about Second Life before taking this course.
   A. Yes
   B. No

Section 1: Experiences in a Virtual World
Please circle the best response that indicates your views.

3. I found the virtual world easy to learn.
   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

4. It was easy to communicate inside the virtual world.
   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

5. It was easy to move (to walk, to run, etc.) my avatar inside the virtual world.
   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

6. It was easy to find different islands (locations) inside the virtual world.
   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

7. It was easy to edit my avatar’s appearance.
   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree
8. Collaborating with team members to complete the team building activity in Second Life was easy.

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

9. I found the wide-open environment inside the virtual world to be distracting.

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

10. After taking this course, I have the skills necessary to use virtual worlds.

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

11. The virtual world activities we completed during the course helped me learn how to operate effectively inside virtual worlds.

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

Section 2: 21st Century Skills

Please circle the best response that indicates your views.

12. Virtual worlds could be used to encourage collaboration among students.

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

13. Virtual worlds could be used by students to brainstorm new ideas concerning how to solve problems.

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

14. Virtual worlds could be used to help students learn how to make economic decisions.

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

15. Virtual worlds could be used by students to communicate thoughts/ideas in diverse environments.

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

16. Virtual worlds could be used by students to find/assess different sources of information.

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree
17. Virtual worlds could be used by students to study ethical issues surrounding the use of information technologies (digital technologies, Web 2.0 tools, etc).

18. Virtual worlds could be used by students to work with diverse students from around the world.

19. Virtual worlds could be used by students to participate in civic life by learning about government processes.

20. Virtual worlds could be used by students to obtain information about healthy living.

21. Virtual worlds could be used by students to practice critical thinking skills while solving problems.

22. Virtual worlds could be used by students to create media products.

23. Virtual worlds could be used by students to learn how to negotiate with team members on group projects.

24. Virtual worlds could provide leadership opportunities for students while they work with other students.

25. Virtual worlds could provide opportunities for students to be self-directed learners.
Section 3: Use of Virtual Worlds

Please circle the best response that indicates your views.

26. In the future, as a teacher I would feel comfortable using Second Life with my students.

   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

27. In the future, as a teacher I would feel comfortable using virtual worlds with my students.

   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

28. Potential exposure of students to inappropriate content in a virtual world would prevent me from using it in a K-12 classroom.

   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

29. Potential interruptions into class activities in a virtual world from uninvited avatars would prevent me from using it in a K-12 classroom.

   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

30. The robust computer software and hardware requirements needed to operate virtual world software would prevent me from using it in a K-12 classroom.

   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

31. Potential financial cost of operating inside a virtual environment would prevent me from using it in a K-12 classroom.

   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

32. Potential parental concern about their children operating in a virtual environment would prevent me from using it in a K-12 classroom.

   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

33. The possibility of students being harassed by avatars not associated with official class activities would prevent me from using it in a K-12 classroom.

   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree

34. Potential reluctance of students to accept virtual worlds as an educational tool would prevent me from using it in a K-12 classroom.

   Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree
Appendix H

Random Student Number _______

Technology Use Post-Survey
(Post-Survey)

**Directions:** This survey is anonymous. **You must be age 19 years and up to complete this survey.** Please **DO NOT** write your real name on this survey, and please answer **all** questions in the survey. Once survey data have been recorded, all surveys will be destroyed. Below is a list of questions which ask students about comfort and confidence in using digital technologies. Read each one carefully and **circle/underline** the answers that best describe you or your opinion. Please remember that there are no correct or incorrect answers. Thank you for taking the time to answer the questions.

**Section 1: Confidence/Comfort with Using Technology**

How would you describe your comfort and confidence level with using technology? Please circle the best response. Responses include Strongly Disagree (SD), Disagree (D), Somewhat Disagree (SWD), Somewhat Agree (SWA), Agree (A), and Strongly Agree (SA).

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
| 1. Computers are reliable.  
SD  | D       | SWD               | SWA            | A     | SA            |
| 2. The more technology you use, the more respect you get from your peers.  
SD  | D       | SWD               | SWA            | A     | SA            |
| 3. I feel comfortable using technology.  
SD  | D       | SWD               | SWA            | A     | SA            |
| 4. Computers and related technologies isolate students from one another.  
SD  | D       | SWD               | SWA            | A     | SA            |
| 5. I am interested in computers and related technologies.  
SD  | D       | SWD               | SWA            | A     | SA            |
| 6. I am interested in learning new technologies.  
SD  | D       | SWD               | SWA            | A     | SA            |
| 7. I am interested in learning new technologies that will help my teaching in the future.  
SD  | D       | SWD               | SWA            | A     | SA            |
Table 1: Attitudes Towards Technology Use

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>I believe that technologies can help me teach better.</td>
<td>SD</td>
<td>D</td>
<td>SWD</td>
<td>SWA</td>
<td>A</td>
</tr>
<tr>
<td>9.</td>
<td>I believe that technologies can help my students learn better.</td>
<td>SD</td>
<td>D</td>
<td>SWD</td>
<td>SWA</td>
<td>A</td>
</tr>
<tr>
<td>10.</td>
<td>I can solve most of the problems when my computer does not work.</td>
<td>SD</td>
<td>D</td>
<td>SWD</td>
<td>SWA</td>
<td>A</td>
</tr>
<tr>
<td>11.</td>
<td>I am confident in using technology in my learning.</td>
<td>SD</td>
<td>D</td>
<td>SWD</td>
<td>SWA</td>
<td>A</td>
</tr>
<tr>
<td>12.</td>
<td>I am confident in using technology to teach.</td>
<td>SD</td>
<td>D</td>
<td>SWD</td>
<td>SWA</td>
<td>A</td>
</tr>
<tr>
<td>13.</td>
<td>I feel comfortable using the Internet to shop.</td>
<td>SD</td>
<td>D</td>
<td>SWD</td>
<td>SWA</td>
<td>A</td>
</tr>
<tr>
<td>14.</td>
<td>Sometimes technology can be a distraction.</td>
<td>SD</td>
<td>D</td>
<td>SWD</td>
<td>SWA</td>
<td>A</td>
</tr>
<tr>
<td>15.</td>
<td>I feel comfortable using the Internet to communicate with people.</td>
<td>SD</td>
<td>D</td>
<td>SWD</td>
<td>SWA</td>
<td>A</td>
</tr>
<tr>
<td>16.</td>
<td>I feel comfortable using technology to collaborate with people.</td>
<td>SD</td>
<td>D</td>
<td>SWD</td>
<td>SWA</td>
<td>A</td>
</tr>
<tr>
<td>17.</td>
<td>I feel comfortable using digital technologies to complete homework.</td>
<td>SD</td>
<td>D</td>
<td>SWD</td>
<td>SWA</td>
<td>A</td>
</tr>
<tr>
<td>18.</td>
<td>I feel comfortable using technologies to create products.</td>
<td>SD</td>
<td>D</td>
<td>SWD</td>
<td>SWA</td>
<td>A</td>
</tr>
</tbody>
</table>

Section 2: Skill Proficiency
How would you describe your proficiency in the following skills? Please circle the best response:

19. Navigating the Web
   - No Experience
   - Beginner
   - Moderate
   - Substantial
   - Expert

20. Finding information in Web searches
   - No Experience
   - Beginner
   - Moderate
   - Substantial
   - Expert
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</tr>
</thead>
<tbody>
<tr>
<td>No Experience</td>
<td>Beginner</td>
<td>Moderate</td>
<td>Substantial</td>
<td>Expert</td>
<td>No Experience</td>
<td>Beginner</td>
<td>Moderate</td>
<td>Substantial</td>
<td>Expert</td>
<td>No Experience</td>
<td>Beginner</td>
<td>Moderate</td>
<td>Substantial</td>
<td>Expert</td>
<td>No Experience</td>
</tr>
</tbody>
</table>
| **No Experience** | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderate | Substantial | Expert | No Experience | Beginner | Moderat
36. Playing video games
   No Experience  Beginner  Moderate  Substantial  Expert

37. Exploring new technology
   No Experience  Beginner  Moderate  Substantial  Expert

38. Troubleshooting software problems
   No Experience  Beginner  Moderate  Substantial  Expert

39. Troubleshooting hardware problems
   No Experience  Beginner  Moderate  Substantial  Expert

Thank you for participating in the survey! Your help is very much appreciated!
Appendix I

Second Life Experiences Focus Group Guide

Introduction
I want to thank you for coming out today. I know how busy all of you are and I really appreciate your willingness to help me out with this focus group. Please remember that you must be age 19 years and up to participate in this focus group session.

How many of you have been in a focus group before? Well, the main reason why we bring a whole group of people together is so that we can hear all of your different ideas and experiences. Today we’ve invited you here because we want to hear about your experiences related to Second Life.

As you know, my name is ___________________. And I am a _______________________. I am here today to learn from all of you about your experiences related to Second Life. Also, I am here to make sure each of you has a chance to talk and share your unique experiences. So being a good facilitator and listener are my primary roles. Okay. Let’s talk about your role.

Moderator/Participant Roles
The basic way this works is that you should feel like this is your group. So you will be the talkers and I will be the listener. Even if you are a little shy, I want you to find the “talker” in you.

In fact, most of the talking you will be doing will be with each other. I’ll have some questions that I need to ask, but for the most part you will be talking among yourselves. My basic job is to make sure that the topics get fully explored, and to make sure that we get to hear all of your different points of view.

Ground Rules
We do have a few basic ground rules, but these are really things about talking in groups that we all learned a long time ago.

The first thing is to participate. The reason that we have invited (4-8 say the number that applies) people today is so we can hear your different points of view. So we need everybody’s help to have a good group.

The second thing is to take turns. We know that some people like to talk more than others, but sometimes you may have to hold on to some of the things you like to say, so everyone in the group has time to talk.

Finally, it’s all right to disagree with each other, but please be polite when you do.

Taping Procedures
We will be audiotape recording the discussion here today. That way, we don’t have to try to write down everything that you discuss in our group today. After the study is finished, the audiotape recording will be destroyed.

Confidentiality
Any comments you make here today will be confidential. Your names or any other identifying information will not be included in our report. We are interested in what you as a group have to say, not in who says what. So we want you all to feel like you can speak freely.
Finally, we ask that you respect each other’s privacy. Whatever we say hear today is just for this group. I know you don’t want other people repeating anything that would violate your privacy, so we all will need to trust each other.

**Introductions (5 minutes)**

A focus group is most successful when you openly share ideas with each other, like people do in everyday conversations. So to get this conversation started today, everyone should:

In your opinion (and this is your opinion), what do you think about using technology in education?

---

Okay, let’s get the conversation started. (10 minutes)

Let’s talk about your initial introduction to Second Life (when your instructor first introduced it to you and helped you set up your avatar). What were you thinking? Please be as honest as possible.

Before taking CAT 250, do you feel that you had the skills necessary to work with Second Life and to use Second Life?

Before taking CAT 250, had you ever heard of or learned about 21st Century Skills?

**Potential Problems (10 minutes)**

Let’s talk about potential problems you may have had with Second Life.

Did you ever encounter someone in Second Life that you did not know? If so, was this person helpful, rude, etc.?

Were you distracted by the environment in Second Life? (In other words, was the world too big? Did you get lost? Etc.) If so, please explain.

Were you at any time exposed to any inappropriate content while you were inside Second Life? Please explain.

Did you have any computer problems with the Second Life software? (Did you try to download it? Was it slow? Did it crash?) Please explain.

Do you think Second Life is easy to learn how to use? Is it complicated? Please explain.

Are there any problems or issues you had with using Second Life that I haven’t mentioned? Anything you would like to add or explain? Anything I missed that I need to know as an instructor?

**Potential Good or Improvement (10 minutes)**

Let’s think about what you learned during this experience.

Do you feel that learning how to use Second Life could help you learn how to use other digital tools or other virtual worlds? Please explain.
Did learning how to use a virtual world like Second Life possibly help you feel confident about learning other digital technologies (Web 2.0 tools)? Did it help you feel confident about implementing other digital technologies as a teacher?

Do you think that you used any 21st century skills while you completed the Second Life Activities? If so, which ones?

Did you feel that the role-play activity was relevant to the course? Did it prepare you to use Second Life or other virtual environments? Why or why not?

Did you feel that the group building activity was relevant to the course? Did it prepare you to use Second Life or other virtual environments? Why or why not?

**Opinions of Second Life (10 minutes)**

In your opinion, do you think using Second Life could be used to help pre-service teachers as they prepare and train to be teachers? Could it be used in education courses or in college courses? Please explain.

In your opinion, do you think Second Life or potentially other virtual worlds have value as a potential educational tool? (Also, would you use Second Life or other virtual world with your future students or other teachers?) Why or why not? Please explain.

How confident and/or comfortable do you now feel about using Second Life or other virtual environments as a student? As a teacher?

**SUMMARY (5 minutes)**

For this last topic: imagine this is the most important thing you want me and others to understand. It could be something related to what we have already talked about or it could be something new that you haven’t already shared.

WHAT IS THE MOST IMPORTANT THING YOU WANT ME AND OTHERS TO KNOW AND UNDERSTAND ABOUT YOUR EXPERIENCE WITH SECOND LIFE?

**WRAP-UP:**

1. Thank participants for coming
2. Shake hands and thank again.