

ONLINE COURSE DESIGN ELEMENTS TO BETTER MEET THE ACADEMIC NEEDS  
OF STUDENTS WITH DYSLEXIA IN HIGHER EDUCATION

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This study sought to determine if an online course designed and delivered in Second Life can meet the needs of higher education students with dyslexia. The course design incorporated strategies from Gagne' and Briggs' principles of instruction, Gagnon and Collay's constructivist learning design, Powell's key learning needs of dyslexics, and elements of universal design. Specific design elements are discussed including screen captures from the design. The study employed a mixed methods approach incorporating an online survey, recorded observation session, and two follow up interviews. The observation session and interviews were only completed by the sample population of eight participants, which included three participants with dyslexia and five participants without dyslexia. The sample population was selected using purposeful sampling techniques to ensure the widest representation of the population with a small sample. Extensive excerpts of the sample participants' interview responses are presented and discussed, including participants' suggestions for improving the course design. Key findings from all three data sources are discussed. Finally, implications for instructional design and special education and suggestions for further research are presented.

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By

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## TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS .....	iii
LIST OF TABLES .....	ix
LIST OF ILLUSTRATIONS .....	x
CHAPTER 1 INTRODUCTION .....	1
Purpose of the Study .....	2
Relevance and Value of the Study .....	2
Methods .....	3
Assumptions and Limitations of the Study .....	4
Organization of the Study .....	5
CHAPTER 2 REVIEW OF RELATED RESEARCH AND THEORY .....	6
Overview .....	6
Disabilities .....	9
Learning Disabilities .....	9
Dyslexia .....	11
Dyslexic Cognition .....	14
Instruction Techniques for Students with Dyslexia .....	15
Key Learning Needs of Dyslexic Students .....	18
Online/Web-based Learning .....	20
Blended Classes .....	21
Virtual Environments .....	22
Second Life .....	24
Instructional Design Theories .....	37
Gagné and Briggs Events of Instruction .....	37
Gaining Attention .....	41
Informing the Learner of the Objectives .....	41
Stimulating Recall of Prerequisite Learned Capabilities .....	42
Presenting the Stimulus Material .....	42
Providing Learning Guidance .....	42
Eliciting the Performance .....	43

Providing Feedback .....	43
Assessing Performance .....	44
Learning Outcomes .....	44
Constructivist Learning Design .....	48
Situation .....	49
Grouping .....	49
Bridge.....	49
Tasks .....	50
Exhibit.....	51
Reflection.....	52
Universal Design for Learning (UDL).....	53
Multiple Means of Representation and Presentation .....	56
Multiple Means of Strategic Engagement.....	56
Multiple Means of Expression.....	56
Accommodating Learning Disabilities in Online Learning.....	56
A Second Life Course Design for Review by Dyslexics.....	59
Overview of Course .....	59
Course Structure.....	61
Course Materials .....	64
Course Navigation .....	66
Practice and Assessment.....	66
Time Management .....	68
<b>CHAPTER 3 METHODOLOGY .....</b>	<b>69</b>
Background.....	69
Research Setting.....	70
Participants.....	70
Sampling Procedure.....	71
Methods and Procedures for Data Collection .....	72
Survey .....	73
Observation.....	73
Interviews.....	75
Reflective Journal .....	77

Methods and Procedures for Data Analysis.....	77
Survey Analysis .....	78
Observational and Interview Analysis .....	78
Validity .....	82
Rigor and Trustworthiness .....	82
Summary .....	84
<b>CHAPTER 4 RESULTS .....</b>	<b>85</b>
Results (All Participants) .....	85
Difficulties Experienced with Face to Face Classes .....	87
Difficulties with Online Classes .....	89
Disabilities .....	90
Accommodations .....	91
Online Activities .....	92
Online Classes.....	95
Video Games.....	97
Second Life .....	98
Results (Purposeful Sample).....	99
Deborah.....	100
Cheryl.....	101
Billy.....	101
Nathan .....	102
Irene .....	102
Jack .....	102
Rachel .....	103
Liz .....	103
Survey Results .....	104
Disabilities .....	104
Accommodations .....	104
Demographics .....	105
Difficulties Experienced with Face to Face Classes .....	106
Difficulties with Online Classes .....	107
Online Activities .....	108

Online Classes.....	111
Video Games.....	112
Second Life.....	114
Results of Interviews and Observations.....	114
Rachel, 35, Female, Pre Pharmacy Major, No Learning Disability .....	115
Billy, 25, Male, Mechanical Engineering Technology Major, Learning Disabled .....	117
Deborah, 23, Female, General Studies Major, Learning Disabled .....	118
Jack, 26, Male, Business Computing and Information Systems Graduate Student, No Learning Disability .....	119
Cheryl, 25, Female, Sociology Major, No Learning Disability.....	120
Irene, 21, Female, Foreign Language major, No Learning Disability .....	122
Liz, 29, Female, Human Development Major, Learning Disabled.....	124
Nathan, 19, Male, Sociology major, No Learning Disability.....	127
Second Interview .....	130
Difficulties with Prior Classes .....	130
Advantages to Online Classes.....	134
Favorite Classes .....	136
Appropriate Classes for Second Life Course Design .....	138
Least Favorite Classes.....	140
Dyslexia Difficulties .....	142
Accommodations .....	144
Accommodations' Effect on Grades.....	145
Coping Strategies .....	146
Classes Inappropriate for Second Life Course Design .....	148
Interpersonal Interactions.....	148
Favorite Games and Game Strategies.....	149
Classes in Which Participants Excel.....	151
Observations .....	152
Summary.....	154
 CHAPTER 5 CONCLUSIONS AND IMPLICATIONS .....	 155
Review of Participants .....	155
Deborah.....	155



Billy.....	156
Liz .....	156
Cheryl.....	156
Nathan.....	157
Irene .....	157
Jack .....	157
Rachel .....	157
Emergent Themes .....	158
Interaction/Engagement .....	158
Student Control of Learning .....	166
Online Activity/Online Course/Video Game Experiences .....	169
Technical Problems/Second Life Mechanics .....	172
Dyslexia Coping Strategies and Accommodations.....	174
Coping Strategies .....	175
Accommodations .....	179
Research Problem Results.....	181
Sub Questions .....	181
Implications for Instructional Design .....	187
Lessons Learned.....	188
Suggestions for Further Research .....	191
Conclusion .....	194
APPENDIX A SURVEY CONSENT FORM .....	197
APPENDIX B OBSERVATION/INTERVIEW CONSENT FORM.....	200
APPENDIX C SURVEY .....	203
APPENDIX D OBSERVATION FORM .....	214
APPENDIX E INITIAL FOLLOW UP INTERVIEW FORM .....	216
APPENDIX F SECOND FOLLOW UP INTERVIEW FORM .....	222
APPENDIX G VIDEO GAME CATEGORIES REPORTED IN SURVEY RESULTS .....	226
REFERENCES .....	228

## LIST OF TABLES

	Page
1 Dyslexic Difficulties with Memory .....	12
2 Dyslexic Difficulties with Communication .....	13
3 Dyslexic Difficulties in Organization and Self-Management.....	13
4 Course Elements Mapped to Instructional Design Models.....	39
5 Difficulties Population Experienced in Face-to-Face Classes .....	88
6 Other Face-to-Face Difficulties .....	89
7 Difficulties with Online Classes .....	90
8 Percentage of Population with a Disability.....	91
9 Percentage of Population with Dyslexia.....	91
10 Non-Work, Non-School Online Activities .....	93
11 Participants Experience with Online Classes.....	96
12 Overview of Purposeful Sample Participants .....	100
13 Ethnicity of Sub Population.....	105
14 Ages of Sub Population .....	106
15 Difficulties Experienced in Face-to-Face Classes .....	107
16 Participants Who Experienced Different Difficulties in Online Classes than Face-to-Face Classes.....	108
17 Difficulties Participants Experienced in Online Classes .....	108
18 Number of Students Who Have Taken Various Types of Online Classes .....	112
19 Platforms Used by Participants for Online Classes .....	112
20 Types of Video Games Participants Play.....	113

## LIST OF ILLUSTRATIONS

	Page
1. Second Life entrance screen. ....	24
2. Sistine Chapel re-creation. ....	26
3. International Space Station model at the International Spaceflight Museum. ....	26
4. Re-creation of an ancient Roman seaport. ....	27
5. Apollo 11 moon landing. ....	27
6. Second Life avatar example. ....	28
7. Viewing screen area. ....	60
8. Course area in Second Life. ....	61
9. Social fire pit area in the communal course area. ....	61
10. Group meeting area. ....	62
11. Private practice/study area. ....	63
12. Private practice/study area. ....	63
13. Video screen at entrance to course area. ....	64
14. Tree of knowledge in common area. ....	65
15. Example of color-coded themes. ....	79
16. Example of color coding of themes. ....	81
17. Age range of population. ....	86
18. Ethnicity of study population. ....	86
19. Majors represented in the study population. ....	87
21. Number of hours spent weekly on non work, non school online activities. ....	93
22. Hours spent weekly online for work. ....	94

23.	Hours spent weekly on classes/school work.....	95
24.	Number of hours participants play video games weekly.....	97
25.	Top five categories of video games reported by participants.....	98
26.	Hours spent weekly online for work.....	109
27.	Hours spent weekly online for class or school work.....	109
28.	Hours spent weekly on other online activities.....	110
29.	Other online activities reported by participants.....	111
30.	Hours spent weekly playing video games.....	113

## CHAPTER 1

### INTRODUCTION

Distance learning is a growing trend in higher education and has been for over ten years. According to the National Center for Educational Statistics (2000), in 1997-98, 1,680 public and private 2- year and 4- year postsecondary institutions throughout the United States offered 1,364,000 undergraduate and graduate courses with a total enrollment of 1,661,000 students. In 2000-2001, those numbers grew to 2,320 institutions offering 2,876,000 courses with a total enrollment of 3,077,000 students (NCES, 2000). That trend continues today with many universities devoting large amounts of time and money to increasing their online course offerings (Keller & Parry, 2010). The University of California system recently announced that they are planning to spend \$5 to \$6 million over the next year developing new online undergraduate degrees, even though they have recently been forced to furlough faculty and staff due to serious budget shortfalls (Keller & Parry, 2010).

Effective instruction for students with dyslexia and other learning disabilities is also a growing concern in higher education (Powell, 2003; NRCLD, 2010). Instructors are faced with designing curriculum and delivery strategies that will ameliorate the effects of the disabilities their students experience (NRCLD, 2010). These effects include difficulties with reading, organization, memory, listening, math, and written language (Day & Edwards, 1996; Gay, 1996). On an average college campus in the US, 10-15% of the student population acknowledges a disability (Lissner, 1995). Of that 10-15%, roughly 29% of the students report having a learning disability (Berkold, Bobbitt, & Horn, 1999; Lewis & Farris, 1999; National Center for Educational Statistics, 2000). In 1995, students with learning disabilities were the fastest growing group of individuals with disabilities in higher education (Day & Edwards, 1996). In

2001, it was estimated that a half-million students with disabilities were enrolled in higher education in the US (Schmetzke, 2001). These students were served by 98% of 2-year and 4-year public institutions, 63% of private 4-year institutions, and 47% of private 2-year institutions (NCES, 2000). According to Hadley (2007), the numbers of students with learning disabilities enrolling in higher education continues to increase each year. In the 2008-09 academic year, 99% of 2-year and 4-year colleges and universities and 100% of medium and large higher education institutions in the United States reported enrolling students with disabilities (Lewis & Raue, 2011).

### Purpose of the Study

The purpose of the study was to find online instructional design elements that meet the academic needs of students with dyslexia in higher education. For the study, I created an experimental course design based on Gagnés events of instruction, Ganon and Collay’s constructivist learning design, Powell’s key learning needs for dyslexics, and universal design. The design also employed student centered learning strategies as well. After the design process, the course was implemented and delivered using the multi-user virtual environment Second Life. The research examined how the unique visual and kinesthetic elements could be incorporated into a instructional design within the virtual environment and how they might complement the primarily visual learning style with which many dyslexic students are most comfortable (Powell, 2003).

### Relevance and Value of the Study

This research could potentially be very valuable to faculty and instructional designers in

higher education. As both the distance education trend (Keller & Parry, 2010) and enrollment of students with dyslexia in higher education (Hadley, 2007) continue to grow, the ability to create courses that meet the needs of both students with and without dyslexia will become increasingly more important (Poore-Pariseau, 2010). Additionally, if the use of virtual environments in online learning continues to grow, faculty and instructional designers will need research like this study to help them effectively utilize these emerging technologies to meet the academic needs of a wide variety of students (Margalit & Shamir, 2011).

### Methods

The study employed a mixed methodology in order to get richer data than a purely quantitative approach would allow. It consisted of four phases of data collection including an online survey, observations, and two semi-structured interviews. Data was coded and analyzed using an evolving coding structure. The online survey was completed by 92 participants, both with and without dyslexia. Eight participants, selected from all participants using a purposeful sampling technique, completed the research. A purposeful sample was used to ensure the broadest picture of the population while still keeping the number of interviews and observations to a manageable size for the qualitative methods employed.

Both students with and without dyslexia from an emerging research university in the southwest and were asked to evaluate an experimental course design created in Second Life. The design utilized elements designed to emphasize these students' academic strengths while minimizing their academic weaknesses. The subject matter for the course was taken from a single module of an introduction to communications course, specifically interpersonal conflict resolution. Participants had an opportunity to interact with the course materials and instructional

elements in the course using Second Life. I observed them remotely as they explored and evaluated the course. Immediately following this observed exploration session, I met with each participant for an initial follow-up interview to fully elucidate their opinions and impressions regarding how well the course design met their academic needs as learners in higher education. A second interview was scheduled after each participant reviewed the transcript of his or her first interview. The second interview gathered information about the participant's learning history and preferences. After the second interview, participants were given an opportunity to review the transcripts of both interviews and make any corrections or additions.

The following questions focused and shaped the study:

Does the instructional design of the course implemented using Second Life meet the needs of the dyslexic students in higher education who participated in the study?

The following sub-questions were used to further explore the research question:

- Is the course easily navigable?
- Are the course materials easily accessible?
- Do the modalities in which the course materials are presented meet the needs of the participants?
- What do the participants like about the course?
- What do the participants dislike about the course?
- What would the participants change about the course design?

#### Assumptions and Limitations of the Study

The study is non-positivistic in nature and therefore the results are not intended to be generalizable to the rest of the population as a whole. Instead, they are intended to provide insight and context into the needs of this specific population of participants. Due to the amount of time required to conduct and analyze qualitative research, the number of respondents was kept



small for this study. Also, the amount of time available during the study to interview and observe the participants did lessen the amount of prolonged engagement available.

### Organization of the Study

This dissertation consists of five chapters followed by several appendices. Chapter 1 consists of a brief introduction to the study including a summary of the purpose and relevance of the study and an overview of the methods used in the study. Chapter 2 is a review of the literature relevant to the study. Chapter 3 defines and details the methods used to collect and analyze data in the study. Chapter 4 presents analyses of data collected from the online survey, observations, and interviews conducted during the study. Chapter 5 presents conclusions and implications of the results of the study. Additionally, recommendations for further research are presented. Finally, the appendices contain additional information to support the study including the informed consent forms, recruitment materials, and data collection forms used.

## CHAPTER 2

### REVIEW OF RELATED RESEARCH AND THEORY

The purpose of the literature review is to provide a summary and interpretation of existing knowledge in the fields that directly relate to this study. Topics addressed in this knowledge base include: learning disabilities, dyslexic cognition/learners' needs, online/web based learning, virtual environments, second life in education, Gagné and Briggs constructivist learning design, and universal design for learning instructional design models. Many of the topics listed represent extensive libraries of knowledge in themselves. As such, a complete review is beyond the scope of this study. These areas are briefly summarized in the context of the current research. The topics presented in this chapter are intended to give the reader the necessary background information and foundational knowledge to better understand the research being conducted and the data presented in the study's findings and results.

#### Overview

Web based learning is a major trend in distance education and educational technology (Keller & Parry, 2010). Many major institutions of higher learning are devoting large amounts of money and other resources to developing online classes and even entire degree plans (The Chronicle of Higher Education, 2010). Web-based learning will only continue to grow in response to student needs, requirements, and demand (Picciano, 2001; Albright, Simonson, Smaldino, Zvacek, 2003; Allen & Seaman, 2007; The Chronicle of Higher Education, 2010). There are many reasons that students take web-based classes, including flexible scheduling and geographic concerns. Online learning can also be very beneficial for students with disabilities (Picciano, 2001).

Numerous articles and books have been written covering a wide variety of aspects related to implementation, development, and administration of online courses (Cottrell, 2003; Day & Edwards, 1996; Dimitriadi, 1999; Jonassen, 2002). In the last twenty years, articles concerning disability accommodation and Americans with Disabilities Act (ADA) and Section 508 compliance have become more popular (Lissner, 1997; Powell, 2003; Scott, 1997; Van Dusen, 2000).

Legal issues have become more prevalent since the Americans with Disabilities Act (ADA) was passed (Hackett & Parmanto, 2011). United States federal law now protects students with disabilities from discrimination in higher education. Consequently, institutions of higher education and faculty members are required to make “reasonable” and equitable accommodations for students with disabilities (Scott, 1997). The same federal laws provide for fair and equal access to computing and information technology for all students (Lissner, 1997). Students are also entitled to a form of assessment that allows them to present their knowledge in a way that is not adversely affected by their disabilities (Powell, 2003). Van Dusen (2000) summarized the need for equitable accommodations:

Continued disengagement from the new information technologies based on one’s age, income, race, gender, education, location, household, or physical or cognitive disabilities will have profound societal consequence from which no one will be exempt. Higher education, to no less a degree than other major American institutions, must remove barriers to access- in this case, for non-traditional students and lifelong learners –without sacrificing quality. The solutions will be costly and complicated, but the alternatives will be catastrophic. (p. 40)

Section 504 of the Rehabilitation Act of 1973, sometimes considered the less well known older cousin to the Americans with Disabilities Act (ADA) (Bork, Brown, & Wolf, 2009) is the federal law that mandates accommodations for students with disabilities in higher education. The ADA expanded and further defined the requirements for these accommodations.

Accommodations are handled very differently in higher education than they are in K-12 schools. The most striking change is the shift in focus from entitled accommodations in the K-12 environment to accommodations that prevent discrimination in higher education and the work place. Additionally, students may receive fewer accommodations or be rejected for accommodations entirely in higher education even if they received accommodations in their K-12 schools as part of the free appropriate public education (FAPE) guaranteed to them by the Individuals with Disabilities Education Act (IDEA). Higher education institutions are not bound by the provisions in IDEA or No Child Left Behind (NCLB) as there are no regulations or requirements for higher education institutions in these laws (Bork, Brown, & Wolf, 2009). Consequently, the accommodations colleges, universities, and other higher education institutions are required to offer may differ significantly from those required for K-12 institutions. According to the National Center for Educational Statistics (NCES), institutions that enrolled students with disabilities offered the following accommodations during the 2008-09 academic year: extended time on exams (93%), note takers or scribes in class (77%), faculty course notes (72%), assistance with study skills or learning strategies (72%), alternative exam formats (71%), and adaptive technology or equipment (70%) (NCES, 2011).

The Higher Education Opportunity Act of 2008 (HEOA), which reauthorizes and amends of the Higher Education Act of 1965 (HEA), prescribes many changes and revisions to programs across higher education. However, while it does provide for funding to develop additional programs and grants to assist institutions in meeting the needs of their students with disabilities, none of these programs and grants are currently funded (Higher Education Opportunity Act, 2008). The HEOA does not address specific requirements for accommodating students with disabilities in higher education (Higher Education Opportunity Act, 2008).

## Disabilities

According to the Americans with Disabilities Act (ADA), an individual with a disability is “a person who has a physical or mental impairment that substantially limits one or more major life activities, a person who has a history or record of such an impairment, or a person who is perceived by others as having such an impairment” (US Equal Employment Opportunity Commission, 2009, p. 1). Disabilities include physical impairments and mental impairments. The ADA defines physical impairments as

[A]ny physiological disorder or condition, cosmetic disfigurement, or anatomical loss affecting one or more of the following body systems: neurological, musculoskeletal, special sense organs, respiratory (including speech organs), cardiovascular, reproductive, digestive, genitourinary, hemic and lymphatic, skin, and endocrine. (Disability and Business Technical Assistance Center, 2010, retrieved May 22, 2010)

Mental impairments are defined as “[A]ny mental or psychological disorder, such as mental retardation, organic brain syndrome, emotional or mental illness, and specific learning disabilities” (Disability and Business Technical Assistance Center, 2010, retrieved May 22, 2010). The Disability and Business Technical Assistance Center (DBATC) offers the following example to further explain these definitions:

A person who cannot read due to dyslexia is an individual with a disability because dyslexia, which is a learning disability, is an impairment. A person who cannot read because she dropped out of school is not an individual with a disability, because lack of education is not an impairment. (Disability and Business Technical Assistance Center, 2010, retrieved May 22, 2010)

### Learning Disabilities

The Interagency Committee on Learning Disabilities defines learning disabilities as follows:

Learning disabilities is a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities, or of social skills. These disorders are

intrinsic to the individual and presumed to be due to central nervous system dysfunction. Even though a learning disability may occur concomitantly with other handicapping conditions (e.g. sensory impairment, mental retardation, social and emotional disturbance), with socio-environmental influences (e.g. cultural differences, insufficient or inappropriate instructional psychogenic factors), and especially attention deficit disorders, all of which may cause learning problems, a learning disability is not the direct result of these conditions or influences. (National Adult Literacy, 1998, p.2)

In 1994, 3% of all freshman reported having learning disabilities (Van Dusen, 2000).

According to the American Council on Education (1995), the percentage of all students with disabilities entering college quadrupled between 1978 and 1991, from 2.2% to 8.8% of all students. In 1998, 2 out of 5 first year students who reported having disabilities reported having learning disabilities (Edgar, Goldstein, Murray, Nourse, 2000). This was the largest growth among full time first term students (Van Dusen, 2000). According to fifteen years of data from the National Longitudinal Transition Study (NLTS) the number of students with disabilities in higher education has more than doubled from 15% in 1987 to 32% in 2003 (Newman, 2005). In the 2008-9 academic year, 88% of all 2-year and 4-year institutions that receive federal financial aid in the United States, for a total of 3,680 institutions, reported they enrolled students with disabilities. Of those 3,680 institutions, 86% reported enrolling students with specific learning disabilities, including dyslexia. Additionally, 31% of the types of disabilities reported for all disabilities were specific learning disabilities (National Center for Educational Statistics, 2011). One of the reasons for this growth is that children with learning disabilities grow up to be adults with learning disabilities (Smith & Werner, 1992; Kavale, 1998). They do not “grow out” of their learning disabilities, as was once believed (Gerber, Ginsberg, & Reiff, 1992; Kavale, 1998; Goldberg, Herman, Higgins, & Raskind, 1996; Goldberg, Herman, & Spekman, 1992; Van Dusen, 2000; Smith & Werner, 1992). Consequently, not only will students with learning disabilities continue to be a concern for institutions of higher education, their numbers will

continue to grow (Hadley, 2007; Newman et al. 2010; Dillow & Snyder, 2010). Unfortunately, many of these students leave higher education before graduating. The graduation rate for students with learning disabilities (LD) is only 22% while the overall graduation rate for students seeking a bachelor's degree or equivalent from a four-year institution is 57% (NCES, 2011).

## Dyslexia

Dyslexia is a learning disability involving difficulties with reading, writing, and spelling (International Dyslexia Association, 2002). Unfortunately, that is where the experts cease to agree (Aldridge, Camp, 2007). Though there are several definitions of dyslexia, none of these is a complete description of all the difficulties faced by those who contend with dyslexia on a daily basis (Morgan & Klein, 2000). Many of the definitions are too limited, only accounting for a small portion of the symptoms associated with dyslexia (Keates, 2002). However, the experts cannot seem to agree on what symptoms should be associated with dyslexia (Aldridge, Camp, 2007). They are also unable to come to any consensus about the causes of dyslexia (Aldridge, Camp, 2007). Until the 1990s, the definitions of dyslexia in the United States were primarily concerned with the deficiencies perceived in dyslexics (Morgan, 1996). However, many dyslexics do not feel they are deficient, only that they think differently than most people (Powell, 2003). Consequently, definitions of dyslexia now often view dyslexia from the perspective of these differences (Morgan, 1996). The following formal definition of dyslexia was released by the International Dyslexia Association in 2002 and is also used by the National Institute of Child Health and Human Development (NICHD):

Dyslexia is a specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and / or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and

the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge. (International Dyslexia Association, 2002)

Unfortunately, even this definition is not complete, as it does not account for many of the memory, coordination, and organizational difficulties experienced by many who have been diagnosed with dyslexia (Fitzgibbon & O’Connor, 2002). According to Fitzgibbon and O’Connor (2002), the difficulties that most adult dyslexics experience can be divided into three categories: difficulties with memory, difficulties with communication, and difficulties with organization and self-management. *Adult Dyslexia: A Guide for the Workplace* (Fitzgibbon & O’Connor, 2002) provides a list with explanations, shown in Tables 1, 2, and 3, of the most common difficulties experienced by adult dyslexics.

Table 1

*Dyslexic Difficulties with Memory*

Area of Difficulty	Typical Manifestations
Names, labels, and numbers	<ul style="list-style-type: none"> <li>• Taking longer than average (or failing completely) to learn the names of colleagues, supervisors and managers. Often results in employees avoiding using names and giving a wrong name when making reports that require them to identify people by name.</li> <li>• Inability to remember, or confusing, dates and times; e.g. appointments and meetings.</li> <li>• Forgetting telephone numbers to the extent that they cannot be repeated immediately after hearing them, and failing to learn telephone numbers that are used frequently.</li> <li>• Forgetting door codes, code-using photocopiers, passwords for entering computer systems, standard abbreviations and labels, including the names of common objects.</li> </ul>
Reading text	<ul style="list-style-type: none"> <li>• Forgetting what has been read immediately after reading it.</li> <li>• Taking a long time to extract and retain information when reading material.</li> </ul>
Listening	<ul style="list-style-type: none"> <li>• Forgetting what has been said, or most of what has been said immediately after hearing it.</li> <li>• Losing track of what is being said while listening to it.</li> </ul>

*(table continues)*



Table 1 (*continued*).

Area of Difficulty	Typical Manifestations
Taking messages	<ul style="list-style-type: none"> <li>• Forgetting important parts of the message.</li> <li>• Confusing or reversing information provided in messages.</li> </ul>
Object tracking	<ul style="list-style-type: none"> <li>• Losing personal belongings such as keys, pens, wallet, etc.</li> <li>• Losing materials, particularly when the employee is working on several sites.</li> </ul>

Table 2

*Dyslexic Difficulties with Communication*

Area of Difficulty	Typical Manifestations
Talking	<ul style="list-style-type: none"> <li>• Talking too much, repeating information and ‘going off on tangents.’</li> <li>• Long pauses in mid-sentence and frequently not being able to find the appropriate word.</li> <li>• Poor pronunciation, particularly of long words, which may be pronounced with syllables omitted.</li> </ul>
Listening	<ul style="list-style-type: none"> <li>• Interrupting people or talking over their speech.</li> <li>• Failing to demonstrate listening has taken place by giving replies that are not entirely relevant to what the other person has said.</li> </ul>
Reading, writing and Spelling	<ul style="list-style-type: none"> <li>• Producing concise and fluent written material is often problematic. Typically, dyslexics’ well-organized thoughts become disorganized when they come to write them down.</li> <li>• Making notes in briefings and taking minutes of meetings are usually areas of weakness.</li> <li>• Spelling may be bizarre.</li> </ul>
Messages	<ul style="list-style-type: none"> <li>• Giving confusing or garbled messages, sometimes distorting the message because of word-finding difficulties.</li> </ul>

Table 3

*Dyslexic Difficulties in Organization and Self-Management*

Area of Difficulty	Typical Manifestations
Attention	Easily distracted by noise, object and people. For example, many dyslexics find they cannot continue with a task if other people are having a conversation or if there is any machinery noise; e.g. a photocopier.
Completing unfinished tasks	Dyslexics have difficulty restarting a task- for example, after an interruption- from where they left off. Sometimes they need to start at the beginning again; sometimes they start at the wrong point, which may result in omissions in the completed task.
Time management	Failing to leave enough time to complete journeys and not realizing how long a task has taken are very common problems.

*(table continues)*

Table 3 (continued).

Area of Difficulty	Typical Manifestations
Paperwork	<ul style="list-style-type: none"> <li>• General disorganization, and poor filing and sorting are major problems that lead to a great deal of untidiness.</li> <li>• Not getting paperwork done is very common; for example, dyslexics often put off or avoid writing reports, and completing time sheets and expense claim forms.</li> </ul>

### Dyslexic Cognition

According to Morgan and Klein (2000), “An understanding of the dyslexic cognitive style may overcome the mismatch between how dyslexic people learn, remember, and process information and the ideas, expectations, and assumptions of their non-dyslexic teachers, colleagues, employers, friends, and spouses (p 18).” The cognitive style employed by many dyslexics is different from many non-dyslexics (Klein & Morgan, 2000). In keeping with the trend of recognizing dyslexia as a difference instead of a deficit, it is useful to understand the differences and, in many cases, advantages of how dyslexics think and learn (Klein & Morgan, 2000).

First of all, most dyslexics learn better if the knowledge is presented in a larger context (Klein & Morgan, 2000; Powell, 2003). For example, most dyslexics would have a difficult time remembering three steps in a procedure if they did not know how those steps fit into the rest of the procedure (Klein & Morgan, 2000; Powell, 2003). Many dyslexics also tend to be very visual thinkers (Klein & Morgan, 2000). They usually think of problems in very holistic terms, often seeing the “big picture” before seeing any small details (Klein & Morgan, 2000). Additionally, dyslexics tend to be very good at visualizing multiple dimensions of drawings, often being able to extrapolate the third dimension from two dimensional drawings and plans (Klein & Morgan, 2000; Powell, 2003). They tend to learn very well from visual aids such as diagrams and

transparencies (Klein & Morgan, 2000; Powell, 2003). Tactile-kinesthetic methods of learning can also be very beneficial as many dyslexics are very good at learning through a “hands on” approach (Klein & Morgan, 2000; Powell, 2003).

### Instruction Techniques for Students with Dyslexia

Educational researchers and educators have long sought effective methods for instructing and supporting students with dyslexia, beginning with the research of Samuel Orton in the early twentieth century (Aldridge & Camp, 2007). Though his instruction methods and those based on his research are considered controversial by many current researchers and practitioners, his work provided a foundation for current research (Ott, 2001; Snowling, 2006). Orton’s work is discussed below, followed by a brief discussion of the controversial aspects of his work.

Many dyslexia remediation and instruction methods are based on the research of Dr. Samuel Orton, considered by some dyslexia experts to be the father of dyslexia research, remediation, and instruction (Ott, 2001; Snowling, 2006). Dr. Orton was a pathologist, neuropathologist, neurologist, and psychiatrist. His work mostly focused on the neurobiological concepts and theories surrounding dyslexia (Orton, 1928). In 1917, Dr. Orton read Hinshelwood’s (1917) manuscript on “Congenital Word Blindness” or unexplained reading problems experienced by intelligent children. Orton began his own research into the reading problems, calling them strephosymbolia or “twisted symbols.” Strephosymbolia is known today as dyslexia (Orton, 1925). He believed dyslexia was not caused by vision or hearing problems, other popular hypotheses at the time, but was instead caused by a language problem or a “specific reading disability” as he labeled it in 1928. Some experts still refer to dyslexia by the name specific reading disability (Orton, 1928).

Orton also believed in focusing on the strengths of his patients, not just their weaknesses. He continually reiterated that all dyslexics are teachable with appropriate instruction (Henry, 1998). In his speech to a group of Oskaloosa teachers, he stated that problems learning to read are a disability rather than a defect, as was also popular opinion at the time. Many teachers felt that students with dyslexia were just lazy or unmotivated. Unfortunately, this opinion has remained current with many uneducated educators (Henry, 1998). Henry (1998) provides a quote from Dr. Orton's speech to the Oskaloosa teachers "This means we do not look upon them (reading difficulties) as deficiencies which cannot be cured but rather as special handicaps requiring special methods or often simply more careful and painstaking application of usual methods" (p. 7).

Orton believed that dyslexia has a biological root, but he also felt it should be treated through education. As early as 1925, he suggested that

...the logical training for these children would be that of extremely thorough repetitive drill on the fundamentals of phonic association with letter forms both visually presented and reproduced in writing, until the correct associations were built up and the permanent elision of the reversed images and reversals in direction was assured. (Orton, 1925, p 614)

Thus, the idea of multi sensory instruction was born. However, even though he felt the methods should contain "extremely thorough repetitive drill" he also insisted the instruction not be programmed and be adaptable to the individual needs of the learner (Orton, 1925).

Orton began working with Anna Gillingham in 1931 to develop an effective method of instruction and remediation for dyslexic children that resulted in the creation of the Orton-Gillingham method in 1956(Gillingham & Stillman, 1956). Gillingham believed that dyslexic children were unable to learn to read using "sight word" methods. Instead, they needed an instructional method that "...is based upon the constant use of associations of all of the

following: how a letter or word looks, how it sounds and how the speech organs or the hand in writing feels when producing it” (Gillingham & Stillman, 1956, p. 17). This educational theory formed the basis for many other multi-sensory methods such as the Herman method, alphabetic phonics, Project Read, the Slingerland method, Phono-Graphix, and the LANGUAGE! method (Henry, 1998; Klein & Morgan, 2000). However, most of these methods were developed for children (Henry, 1998). Some of them can be used for adults, such as Project Read and Phono-Graphix (Klein & Morgan, 2000). These methods do not take into account that adults must have control over their own learning or they will not learn (Knowles, 1998).

The controversy surrounding Orton’s methods and other methods based on his work appears to be fueled by disagreements among researchers about the fundamental cause of dyslexia (Aldridge & Camp, 2007). Orton and several researchers after him believed that dyslexia is caused by neurobiological disorders resulting in difficulties with phonological processing (Orton, 1928; Lyon, 1995; Shawitz & Shawitz, 2003; Brunswick et al., 2001). Aldridge and Camp (2007) argue that there is no empirical evidence to support these theories. They point to several studies that question this theory (Cossu, et al., 1988; Geva, Siegel, 2000; Goswami, 2000; Ho, Lai, 1999; Frost, Katz, 1992; Everatt, Salter & Smythe, 2004; Wimmer, 1993) including a study of Hungarian children that showed poor readers demonstrated phonological proficiency similar to their peers with proficient literacy skills (Everatt, Gyarmathy, Ocamp, & Smythe, 2004).

Another factor of the controversy surrounding many popular dyslexia instruction methods stems from their use of tightly scripted, rigidly sequenced courses of instruction (Aldridge & Camp, 2007). Many of these commercially developed reading programs, such as Merrill Linguistic Readers (Otto, Rudolph, Smith, & Wilson, 1975), DISTAR (Bruner & Engelmann,

1978), Sullivan Programmed Readers (Buchanan, 1973), and ita (Pitmann, 1969) allow for little or no variation to meet the needs of individual students. Additionally, many of them use nonsense text, also called decodable text, and numerous drills and repetitive practice, which are often uninteresting and unengaging for the students (Aldridge & Camp, 2007). The National Reading Panel (2000) reported that there is little research to show if decodable text is an effective contribution to phonics instruction programs. A better approach, according Aldridge and Camp (2007) and Allington (2005) for some researchers and practitioners, is to develop more flexible reading instruction programs that meet the individual needs of the students. The former president of the International Reading Association, Richard Allington, challenged his members to question the validity of these commercial reading programs,

In fact, I know of no research suggesting that the use of any commercial core reading program reliably produces better results than the use of locally developed core reading programs. Indiscriminate use of any core program such that all children in a grade are placed in a single strand, text, or level contradicts everything research and practice has taught us about matching students with curriculum appropriate to their level of development. The same is true for adoption of a single intervention program for struggling readers. Children differ. Struggling readers differ. Any curriculum decision that fails to acknowledge this must be considered unscientific. (Allington, 2005, p 18)

### Key Learning Needs of Dyslexic Students

Higher cognitive processing skills such as reasoning, interpreting, understanding, creating and synthesizing are generally not affected by dyslexia (Powell, 2003). However, a dyslexic student may have trouble performing higher-level tasks because he or she is unable to understand and process written course material, or he or she may have difficulty processing information presented orally (Powell, 2003). In general, dyslexic students vary greatly in their abilities and level of performance, including students who have developed exceptional compensation

strategies (Cottrell, 1966) and those who are very gifted students despite their dyslexia (Aaron & Guillemord, 1993; Everatt, Smythe, & Steffert, 1999). Often, dyslexic students show an unusual aptitude for mathematical, spatial, linguistic and creative abilities which allows them to excel in such fields as engineering, architecture and design. Some researchers believe this is due to a physiological difference in the brains of dyslexics (Miles & Miles, 1993; Stein, 2010). Dyslexic students tend to prefer higher order thinking skills, deep understanding of concepts, and personalized and applied approaches to study, usually finding them easier than rote learning (Powell, 2003). Students with specific learning difficulties, such as dyslexia, are likely to perform best academically or in the work place when:

- They can be creative
- They are relaxed and confident rather than stressed and pressurized
- They have sufficient time to work at their own pace, double-check their actions or output, and undertake multiple practice in new tasks
- They can pause, relax, and focus before and during tiring or demanding tasks
- They can plan out their task and compensate for their specific difficulty rather than being 'put on the spot'
- They are given time and space to work out how to perform a task 'from within'
- They are allowed to demonstrate their understanding in the means that best suits their disability (variously, by voice, hand-writing, typing, voiced software, production of artifact, practical demonstration, etc.)
- They can make use of their best sense modality, such as sophisticated color coding, auditory memory, or opportunity to move about and shift position
- Their attention is not diverted by unnecessary interruptions or distractions
- Visual (such as overheads/handouts) and sound (such as tape) stimuli are good quality
- Unnecessary hurdles are removed in due consideration for the additional time that tasks can take

- Verbal instructions are accompanied by written ones, and vice versa (Powell, 2003, p 128-9)

### Online/Web-based Learning

For the purpose of this study, online and web-based learning are defined as higher education classes that are delivered asynchronously via the World Wide Web with no face to face class meetings, including courses delivered via Learning Management Systems such as BlackBoard, WebCT, Angel, and Desire2Learn. Universities have been offering online classes since the early 1980s, but online learning has become much more popular and accessible since the development of the World Wide Web (Albright, Simonson, Smaldino & Zvacek, 2003). Institutions of higher learning have been increasing their online course offerings to try to keep up with student demand (Allen & Seaman, 2007).

Since 2002, the Sloan Consortium (Sloan-C) has conducted yearly surveys to track online learning in the US (Allen & Seaman, 2007). In 2009, the Sloan-C surveyed over 2,500 colleges and universities about their online learning activities, development plans, and long term institutional goals relating to online learning (Allen & Seaman, 2009). According to the survey results, online enrollment has continued to grow at a far faster pace than total higher education enrollments. The growth rate for 2009 for online enrollments was 17% higher than the results of the 2008 survey. The overall total higher education enrollment rate only increased 1.2% over the previous year. Over 4.6 million students were enrolled in an online class during the Fall 2008 semester. The survey also found that more than 25% of students enrolled in higher education take at least one class online (Allen & Seaman, 2009).

Online learning is becoming an important long-term strategy for many universities and colleges (Bonk & Kim, 2006). The most recent survey available from the National Center for



Education Statistics (NCES) for the academic year 2006-07 showed that 65% of the 4,160 2-year and 4-year Title IV degree-granting postsecondary institutions in the US offered college-level distance education courses, which includes online courses as well as hybrid or blended classes and other, unspecified distance education methodologies (NCES, 2008). There were an estimated 12.2 million enrollments in distance education classes in 2006-07, with 77% in online classes (NCES, 2008).

The 2009 Sloan-C survey asked respondents how the current economic downturn had affected online course demand. The survey found that 54% of the over 2,500 institutions surveyed reported an increase in demand for face-to-face classes. However, the economic impact has been greatest on demand for online classes with 66% of the surveyed institutions reporting an increased demand for new courses and programs and 73% reporting increased demand for existing courses and programs (Allen & Seaman, 2009). When asked if they believed online learning was critical to their institution's long-term strategy, 74% of the chief academic officers at public institutions reported affirmatively, while 50% of for-profit private institutions (i.e. University of Phoenix) and 51% of private non-profit institutions also agreed (Allen & Seaman, 2009). Online learning is also becoming part of the business continuity plan for many universities. The 2009 Sloan-C survey asked respondents about their contingency plans for an H1N1 epidemic. Sixty-seven percent of the institutions that have a contingency plan reported include using online classes to replace face-to-face classes as a part of their plans (Allen & Seaman, 2009).

### Blended Classes

NCES defines blended classes as those that combine online and face-to-face elements and

reduce in class seat time for students (NCES, 2008). Blended learning was originally conceptualized as a way to improve online learning by incorporating more instructor/student and student/student interaction to improve communication and guidance (Marsh II et al., 2004; Douglas, Frazee, Rossett, 2003). According to the 2006-07 NCES (2008) survey, 12% of the estimated 12.2 million distance education enrollments were in blended classes. In a 2006 survey, conducted by Bonk and Kim (2006), of college instructors and administrators already involved in online learning on their campuses, the majority of the respondents indicated they believed that a stronger emphasis would be placed on blended learning than on fully online courses.

Additionally, the respondents said they believed that blended course offerings would increase in future years from the estimated 25% of courses offered at the time of the survey to nearly 100% of course offerings containing blended elements (Bonk, Kim, 2006). More recently, many schools reported a blended model as part of their H1N1 contingency plans (Allen & Seaman, 2009). A recent survey of faculty from 151 extensive doctoral research universities revealed that the majority of the respondents believed blended learning improved their instructional abilities and helped overcome the limitations of online instruction (Oh & Park, 2009).

### Virtual Environments

Virtual environments have been used in a variety of teaching and training situations for many years. The US military has used virtual environments extensively to train soldiers in a wide range of tasks and jobs ranging from driving a tank, learning to fire torpedoes from a submarine (Prensky, 2000), to interacting with civilians and their customs in foreign countries (Zielke, et al., 2009). In education, virtual environments have been used to teach science (Dede, Loftman, & Salzman, 1996; Chen, Dede, Loftman, & Salzman, 1999; Hedberg, Lim, & Nonis, 2006), social

sciences (Delwiche, 2006), and a variety of higher education online and distance classes (Bronack, Riedl, & Tashner, 2006; Bronack, Riedl, & Tashner, 2005; Ondrejka, 2008).

According to Castranova (2001) and Delwiche (2006) virtual environments have four defining features that include interactivity, physicality, persistence, and safety. Interactivity and physicality are generally accomplished through the use of avatars, or virtual representations of people interacting with the environment. Through their avatars, students can immerse themselves in the virtual environment and learn by collaborating with each other and interacting with virtual items in the environment (Walker, 1990). Avatars are often able to do things that are not possible in the real world, like flying or transforming into non-human avatars. According to Dede (1996), “Giving users magical powers opens up learning in ways that educators are just beginning to understand ” (p. 167).

Safety is another important feature of virtual environments. Virtual environments allow learners to practice high risk activities without suffering the consequences that exist in a real-world environment (Delwiche, 2006). As Grimmelman (2003) points out, virtual death is not very deadly. Students can also take more emotional or social risks they would not be comfortable taking outside of a virtual environment. As Delwiche (2006) states, “Safety is crucial to any learning environment. When students feel threatened, they clam up” (p. 166). Diamantes and Williams (1999) suggest that the uppermost levels of the brain function best in safe, supportive, non-threatening environments. Avatars can offer a level of safety, especially for shy learners or those who are afraid to speak out in face to face classes (Dede, 1996; Kiesler & Sproull, 1991). According to Dede (1996), virtual environments

provide a safe, anonymous opportunity to experiment with a new persona centered on a learning-centered lifestyle. For example, a person who feels ashamed of “being wrong” -- and therefore is frightened of learning-by-doing situations--- while masked within the

context of a virtual community can safely risk making mistakes in the process of learning. (p. 170)

Delwiche's (2006) study of the social science and game development classes he taught in virtual environments revealed that, "...the safety of virtual environments, combined with a mood of playful intellectual freedom, made it easier for students to throw themselves in the role of inquisitive social scientists and game developers" (p. 166).

## Second Life

Second Life is a massive virtual world in which people interact with each other via avatars using text and voice communications (Linden Lab, 2009).

Second Life is a 3D virtual world created by its Residents ... that's bursting with entertainment, experiences, and opportunity. The Second Life Grid™ provides the platform where the Second Life world resides and offers the tools for business, educators, nonprofits, and entrepreneurs to develop a virtual presence." (Linden Lab, 2009)

Figure 1 provides a screenshot of the log in screen for Second Life.

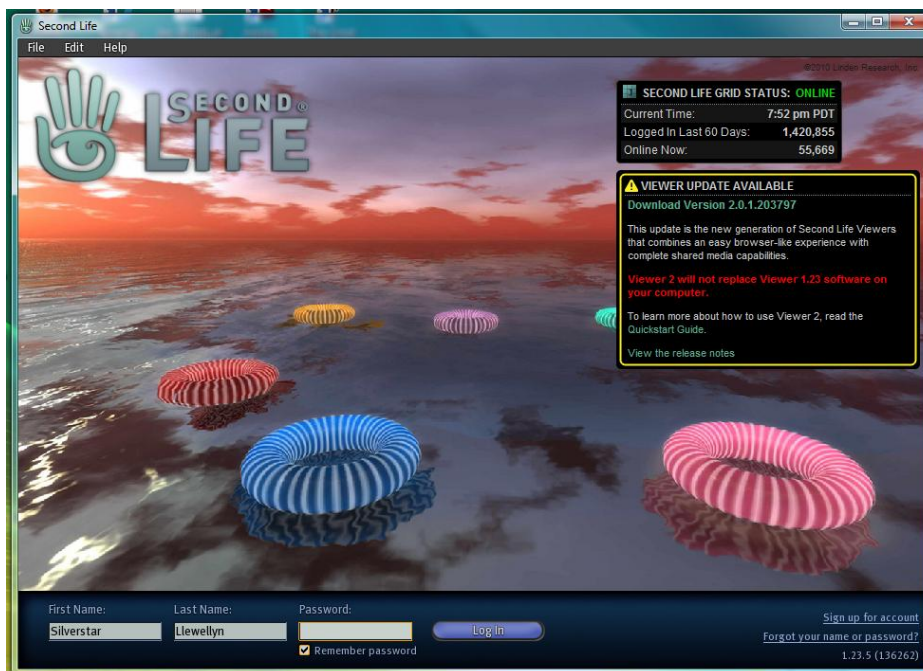


Figure 1. Second Life entrance screen.

Descy (2008) states, “Second Life is a 3D online digital world imagined and created by its residents” (p 5). Au (2008) describes Second Life as “an immersive, user-created online world” (p x). Second Life is massively multi-player online social environment (MMOS) unlike World of Warcraft or Everquest that are defined as massively multi-player online role-playing games (MMOPG). The activity of Second Life’s residents, people who have created avatars or online identities with Second Life, is not directed by preset objectives and plots, as is true in many games. Instead, Residents are concerned with social and community related activities or commerce (Au, 2008).

Another important characteristic that sets Second Life apart from other virtual environments is that everything in the environment is created and owned by Residents. Linden Lab’s philosophy of Resident ownership and control is reflected in their use of the term Resident instead of user (Au, 2008; Linden Labs, 2009). The freedom to custom design and create learning spaces is one of the things that attracted many educators to Second Life over other virtual environments (Boulos, Hetherington, & Wheeler, 2007; Braswell & Childress, 2006; Pence, 2007; Skiba, 2007; Taylor, 2008).

### *Second Life in Education*

Second Life has been used to teach a variety of classes including medical and health education (Woodford, 2007), nursing (Skiba, 2007), systems analysis and design (Kumar, Liu, & Scott, 2010), art (Liao, 2008), history (Carter, Harkin, & Sosnoski, 2006) and language learning (Stevens, 2006) at a variety of institutions including Harvard, Pepperdine, Princeton, Drexel, Ball State, Stanford, UNC Chapel Hill (Descy, 2008), University of Houston (Kumar, Liu, & Scott, 2010), and many of the component institutions in The University of Texas System (The

University of Texas System, 2010). Additionally, there are many educational resources available in Second Life such as models of the Sistine Chapel and the International Space Station. Figure 2 and 3 show screen captures from Second Life of the Sistine Chapel and the International Space Station. There are also 3-D models of eclipses, virtual planetariums that project video and audio podcasts (Price, 2007), and the International Spaceflight Museum, a collaborative effort between NASA and a group of space exploration enthusiasts that contains items such as an amphitheater that displays live feeds from NASA TV and scaled replicas of modern and historical spacecraft (Crider, 2007).



*Figure 2.* Sistine Chapel re-creation.

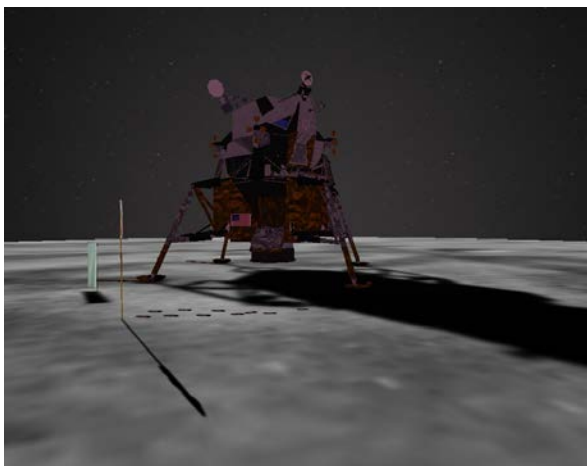


*Figure 3.* International Space Station model at the International Spaceflight Museum.

Proponents of using Second Life to teach higher education classes believe it is a useful tool because of the immersive environment and the ability for anyone to create anything within Second Life (Boulos, Hetherington, & Wheeler, 2007; Braswell & Childress, 2006; Pence, 2007; Skiba, 2007; Taylor, 2008). Educators can create simulations in order to allow students to explore things they cannot explore in reality, such as the Sistine Chapel, the International Space Station, Ancient Rome, or the Apollo 11 Moon Landing. Figure 4 and 5 show screenshots of Ancient Rome and the Apollo 11 Moon Landing from Second Life. As Pence (2007) states, “The human mind has problems visualizing the very small and very large, but in SL [Second Life] it is possible to create molecules that appear as big as a house and galaxies that can fit in one’s hand” (p. 174).



*Figure 4.* Re-creation of an ancient Roman seaport.



*Figure 5.* Apollo 11 moon landing.

Avatars are also an advantage to Second Life over other forms of online learning (Boulos, Hetherington, & Wheeler, 2007; Braswell & Childress, 2006; Pence, 2007). Figure 6 is a screen capture of an avatar from Second Life. Pence (2007), in discussing his students' experiences in his class in Second Life, states, "Many participants report that they feel a strong attachment to their avatar, which enhances both their overall experience as well as the strength of their interaction with others" (p. 174). He believes the human presence avatars bring to Second Life is the key to collaboration and idea exchange in Second Life (Pence, 2007). Braswell and Childress (2006) state, "Virtual online worlds provide an additional level of personality that is missing from the typical chat room environment" (p. 188).



*Figure 6.* Second Life avatar example.

Second Life is a global environment with the potential to bring students together with people around the world (Stott, 2007). As Kumar, Liu, and Scott (2010) state, "The global characteristic of Second Life allows students to explore the world without physical limitations and increases learning opportunities to the global scale" (p. 427). In language classes, this global



access allows students to communicate and interact with native speakers (Stevens, 2006). Students can explore simulations of several famous cities, such as Paris and Rome. Other proponents take advantage of the global community within Second Life to ensure their students are able to interact with communities of experts (Braswell & Childress, 2006; Delwiche, 2006; Kumar, Liu, & Scott, 2010; Skiba, 2007).

Proponents of Second Life also believe the virtual environment can help them gain access for their students to communities of practice that would otherwise be unavailable. Some professors have been able to bring executives into their classes to speak with their students by hosting the sessions in Second Life (Pence, 2007). Additionally, students have access within Second Life to experts from such organizations as NASA and various medical schools and public health institutions (Barker, Doherty, & Rothfarb, 2006; Crider, 2007).

### *Research in Second Life*

Research in Second Life can be divided into two categories: research conducted on Second Life and research conducted in Second Life. Studies in the first category are focused on validating Second Life as a legitimate research platform. Studies in the second category are focused on various research activities that are conducted within the Second Life environment.

### *Studies on Second Life*

Nick Yee was already researching the possibility of studying various communication concepts in online or virtual environments when Second Life caught the interest of social science researchers. Prior to setting his sights on Second Life, Yee had experimented with using haptic devices to study the effects of handshakes and virtual visual identification (Bailenson, et al., 2007; Bailenson & Yee, 2007; Bailenson, et al., 2008). Shortly after Second Life became

available to the public, Yee and several other researchers began trying to determine if results gained from experiments in the virtual world were as accurate and transferrable to the real world as experiments conducted via more traditional research methods (Bainbridge, 2007; Miller, 2007; Bailenson, et al., 2007). Their studies revealed very little difference between the results gained in Second Life and the ones gained in the real world, leading the researchers to conclude that Second Life was a valid research environment (Bailenson, et al., 2007). These conclusions opened the door to a host of research possibilities, including many research questions that are too risky or impossible to adequately study in the real world, such as crowd dynamics, addiction, and phobias (Bailenson, et al., 2007). Additional areas of research include computer mediated communications in a virtual environment and the effect of scripted controlled and non controlled non verbal communication in a virtual world (Antonijevic, 2008; Bailenson, et al., 2007).

Social science researchers have also begun studying Second Life as a treatment option. Second Life has been used to treat phobias and anxiety disorders. Research has shown that changes made to a person's avatar in Second Life can transfer to the person's real life outside of Second Life (Bailenson & Yee, 2007). Many social scientists and mental health professionals are excited about the possibilities this research opens in relation to therapy and treatment options (Gaggioli, Gorini, Riva, & Vigna, 2008).

### *Studies in Second Life*

A variety of studies have been conducted in Second Life. This section will highlight those studies focused on education and student learning. The studies discussed in this section involve classes conducted in Second Life on topics ranging from literature to system design theory to video game design.

At Trinity University in San Antonio, Texas, Delwiche (2006) used Second Life to teach a game design course to 15 communication students. The two primary objectives of the course were to “explore critical themes of cyberculture studies through sustained interaction with other gamers” (Delwiche, 2006, p. 164). and create games that could be played by other residents in Second Life using situated learning. The study revealed three findings. First, it showed that accessibility of game mechanics is crucial to learning; secondly, students preferred to play the game with others. Secondly, students reported they felt they learned a great deal in the course. One student reported, “The availability of knowledge [in Second Life] provided a learning environment unmatched by any other class I have taken. We found ourselves in an enjoyable environment where we could learn from the professor, each other, and countless who we have never even met” (Delwiche, 2006, p. 167). Another student stated, “This is probably the best course I have taken thus far at this university. While I love playing in Second Life, I found the theory equally interesting, and the feeling of exploring new and unexplored media quite exciting (Delwiche, 2006, p167).” Thirdly, Delwiche reports the students produced high quality work in the class, demonstrating that “students had clearly mastered the course material (Delwiche, 2006, p167).”

The University of Texas Austin designed an undergraduate literature class that was intended to use Second Life as a tool to motivate students and help them visualize the writing process (Sanchez, 2007). In the study, an Interactive Qualitative Analysis was conducted to evaluate the student experience of the students in the class. The results of the study appeared to be somewhat contradictory. The students reported anger and frustration with the course activities they were asked to complete in Second Life. They reported that they received no instructions on how to work with the mechanics and interface in Second Life. They also reported they did not

understand how the course activities supported the course objectives. The students also reported they felt the course activities, which required them to build buildings and objects in Second Life, allowed them to think creatively and motivated them to spend large amounts of time working on their creations. But students also complained about the amount of time required for the course activities and reported that many of them were not motivated to spend the required time to complete the activities. In the conclusions, Sanchez states that, in the next phase of the study, the building activities will be replaced with social learning activities and the instructor will explicitly explain how the course activities related to the course objectives in addition to providing instructions to the students on how to manipulate the mechanics and interface within Second Life to complete the course activities.

Kumar, Liu, and Scott (2010) at the University of Houston conducted a fairly complex study which attempted to both evaluate student learning experiences in an MBA-level Systems Analysis and Design course and test the use of the Constructivist Learning Design (CLD) model to teach a distance learning course using constructivist learning principles in Second Life. The researchers state that the features of Second Life allowed them to create this constructivist course. The study consisted of an online pre-course survey consisting of three main sections: 1. Student demographic information, including any Second Life use or experience, 2. Work experience, and 3. System Analysis knowledge and a more extensive online post-course survey. The post-course survey consisted of nine sections covering three main topics: Second Life student use experiences, students' evaluations of the constructivist learning components of the CLD model, and student opinions about Second Life as a learning environment and learning tool.

The results of the Second Life student use experiences section of the post-course survey are based only on the responses of the eleven students who completed all sections of both

surveys. Regarding student experiences as they were using Second Life during the course, the students reported spending an average of 1-3 hours in Second Life completing course activities. Seven students reported they felt Second Life was easy to use, and nine students said they felt comfortable participating in the Second Life course activities. 46% did not think Second Life is an effective tool for searching for learning resources, but 64% (seven students) reported they felt Second Life is an effective tool for communicating with other people. Eight students (73%) agreed that Second Life is an efficient collaboration tool. The researchers were also concerned that the Second Life course activities would consume too much of the students' time as the majority of the students had not taken a course in Second Life prior to the study. Thirty-six percent of the students reported that the time requirements of the Second Life course activities did not affect their daily activities. Twenty-seven percent of the students reported they had to give up some leisure time to accommodate the time requirements of the Second Life course activities. Nine students (82%) reported they also spent time on non-course related activities in Second Life (Kumar, Liu, & Scott, 2010).

The results of the post-course survey sections concerning the CLD model were also based on the responses of the thirteen students who completed the class. The study authors constructed these sections of the survey based on their understanding of the six components of the CLD model: “learning engagement (situations), collaboration/community learning (groups), surfacing knowledge (bridges), in-depth learning/critical thinking embedded in tasks (task), thinking explained (exhibit), and learning reflection” (Kumar, Liu, & Scott, 2010, p. 435).

The survey results for the learning engagement section of the survey showed that the majority of the students had a good understanding of how to achieve the course objectives in the Second Life environment, and they felt that course activities in the Second Life environment

promoted learning engagement. 62% of the students reported they were able to involve themselves in the learning experience by expressing their personal view points and opinions in the Second Life course activities. The study authors concluded that, overall, “Second Life as a learning environment has a positive effect on the learning engagement when the course activities were designed based on group project learning and involving students in the learning process to construct knowledge on their own.” (Kumar, Liu, Scott, 2010, p. 435).

The results of the collaboration and community learning section of the survey revealed that 77% of the students enjoyed collaborating with classmates in the Second Life group activities, and they learned to value different viewpoints through the experience. 85% of the students felt that sharing individual exchanges helped them learn the course subject matter. Finally, 54% of the students felt the Second Life activities promoted improved communication between students and also between the students and the instructor (Kumar, Liu, & Scott, 2010).

According to the authors (Kumar, Liu, & Scott, 2010), the purpose of the section called surfacing prior knowledge was “to find out if student’s prior knowledge contributed to their new knowledge learning, if they had a correct understanding of the knowledge, and connect what they learned with real life experiences” (p. 436). The results were somewhat mixed in this section. Of the 13 students, five agreed and five disagreed that the Second Life learning activities in the course helped them recall prior knowledge and experiences related to the course subject matter, and three students did not give their opinions. Seven students reported that the knowledge they learned in the Second Life course activities was useful to them in their jobs. Eleven students reported they were able to use what they had learned in previous course in completing the Second Life activities in this course (Kumar, Liu, & Scott, 2010).

The Second Life activities in the course required students to think critically and collaborate creatively to complete the required group project. The majority of the students reported the Second Life activities required them to have a deeper understanding of the course subject matter than simple factual recall. A majority also reported that the comments and feedback they received from classmates and the instructor helped them achieve this deeper understanding. Additionally, a majority reported that the Second Life activities helped them develop better critical thinking skills in relation to the course subject matter (Kumar, Liu, & Scott, 2010).

Student opinions of the thinking explained/exhibit Second Life course activities were positive. The assessment for the course included group presentations of their completed group project and case analyses. The group projects were presented collaboratively by the group members and invited speakers from live businesses within Second Life. Seven students reported they were able to explain their thought processes through the Second Life course activities. Eight students believe the Second Life course activities reinforced what they learned in the course, and eleven students felt the Second Life activities allowed them to re-evaluate the knowledge they gained from the course (Kumar, Liu, & Scott, 2010).

Finally, students were asked for their opinions regarding the reflection activities in the course. Students were required to post self-reflection blog posts using the Second Life blog tool throughout the course. Six students reported the reflection activities caused them to re-evaluate past experiences and prior knowledge. The majority of students agreed the self-reflection activities helped them understand the course subject matter, document what they had learned, and helped them synthesize the course information. Nine students also reported their analytical

skills had improved because of the self-reflection activities in the course (Kumar, Liu, & Scott, 2010).

When asked about their opinions of Second Life as a learning environment, the students had mixed reactions. Eight students felt that Second Life did not interfere with their learning, but eight students also stated they did not feel they would learn better in Second Life even though Second Life made learning more fun. The students were divided on whether Second Life provided a realistic learning environment that was generalizable to real life. The majority of the students felt the course made excellent use of the Second Life technology and that the course objectives and learning activities were well coordinated. A smaller majority felt that Second Life should be used for other courses. The same number would also recommend this course to other students (Kumar, Liu, & Scott, 2010).

Overall, the survey results appear to show that students liked the collaboration, interaction, and reflection afforded by the use of Second Life in this course. In the open-ended questions, students also commented about the opportunities Second Life afforded them to communicate and interact with their fellow students and the instructor. They also commented that Second Life offered a learning experience similar to a face-to-face classroom but with the convenience and flexibility of an online class (Kumar, Liu, & Scott, 2010).

In a 2009 study, researchers attempted to evaluate synchronous lectures delivered in the Second Life environment of the Department of Mathematics and Information at the University of Salerno (Francesse, Lucia, Passero, & Tortora, 2009). In the study, the researchers evaluated three lectures from a Fundamentals of Computer Science course for participant impressions of presence, awareness, communication, and comfort with the virtual environment. Twenty-six students voluntarily participated in the study. Participants completed a pre-experiment



questionnaire to assess student background experience with computers and video games. The three lectures, each an hour long, were presented on consecutive days. At the conclusion of the final lecture, participants were asked to complete the Presence and Perceived Sociality questionnaire. The results of the study indicated that Second Life successfully supports synchronous communication and social interaction. Additionally, instructors and tutors reported increased student motivation in the course (Francesse, Lucia, Passero, & Tortora, 2009).

### Instructional Design Theories

A variety of instructional design theories and models have been developed for designing classes, both online and traditional face to face classes (Andrews & Goodson, 1995; Schiffman, 1995; Shrock, 1995). Kumar, Liu, and Scott (2010) utilized the constructivist learning design (CLD) model developed by Gagnon and Collay (2006) in their course design research described above. The course design for the present study incorporates elements of four different instructional design models: Gagné and Briggs events of instruction, Gagnon and Collay's constructivist learning design, Powell's key learning needs of dyslexics, and universal design for learning (UDL). Gagné and Briggs' and Gagnon and Collay's models and universal design are discussed further below. Powell's model was discussed earlier in this chapter under the heading "Key Learning Needs of Dyslexic Students". Table 4 provides an overview of each of the instructional design models and how the elements of the course design correspond to the design elements of each of the models (Briggs, Gagné & Wagner, 1992; Collay & Gagnon, 2006; Powell, 2003).

### Gagné and Briggs Events of Instruction

Gagné and Briggs developed an extensive system of instructional system design they

called principles of instructional design. Their principles encompass an overarching model that outlines fundamental theories about learning, learner characteristics, definitions of learning outcomes, and specific strategies for designing and evaluating instructional events.

According to Gagné and Briggs (1992), “A fundamental reason for instructional design is to ensure that no one is ‘educationally disadvantaged’ and that all students have equal opportunities to use their individual talents to the fullest degree” (p. 5). In order for instruction to encourage effective learning, it must somehow influence the internal processes of learning listed below (Briggs & Gagné, 1995, p. 203):

1. Gaining attention
2. Informing the learner of the objective
3. Stimulating recall of prerequisite knowledge
4. Presenting the stimulus material
5. Providing learning guidance
6. Eliciting the performance
7. Providing feedback about performance correctness
8. Assessing the performance
9. Enhancing retention and transfer

Gagné and Briggs (1995) devised their eight events of instruction as “a deliberately arranged set of external events designed to support internal learning processes” (p. 11). These events shape and guide the design of the course, the course materials, and any other stimulation presented to the learner. As with any other instructional design model, the purpose of these events of instruction is to “bring about the kinds of internal processing that will lead to rapid, obstacle-free learning” (p. 11).

Table 4

*Course Elements Mapped to Instructional Design Models*

Course element	Gagné and Briggs	Constructivist Learning Design	Key Learning Needs of Dyslexic Students	Universal Design for Learning
Course materials (text, web pages, multimedia, slide shows, audio lectures)	Materials presented in multiple modalities, materials chunked into web pages with minimal scrolling, materials start with reminders about key concepts and ideas to stimulate recall of prerequisite learning	Situation, bridge	Student control over learning, materials presented in multiple modalities, text materials broken into smaller sections, text materials also downloadable to allow students to adjust type font, size, and colors	Multiple means of representation and presentation Multiple means of strategic engagement
Private study/practice areas			Minimize unnecessary distractions	
Communal course areas		Social learning environment		
Intro video	Gain students' attention, help with course navigation, present course objectives		Help with course navigation	Multiple means of representation and presentation
Course objectives at entrance of course	Present course objectives	Situation	Help create framework for information in course	
Non linear course design			Students control own learning pace and order and can revisit materials as often as they need	Multiple means of strategic engagement

*(table continues)*

Table 4 (continued).

Course element	Gagné and Briggs	Constructivist Learning Design	Key Learning Needs of Dyslexic Students	Universal Design for Learning
Discussion posts	Provide opportunity for instructor feedback, allow instructor to assess student knowledge	Reflections, tasks; exhibits	Motivation to read and understand course materials	Multiple means of strategic engagement, multiple means of expression
Case studies (group projects)	Provide opportunity for instructor feedback, allow instructor to assess student knowledge	Groupings, exhibits, reflections	Multiple opportunities to practice skills learned in course, authentic assessment that allows students to demonstrate knowledge without extensive text or standard tests, present situations relevant to students	Multiple means of strategic engagement, multiple means of expression
Signposts and navigation aids	Provide learning guidance			
Course calendar	Affective strategy		Help with time management	
Grading rubrics (all posted at start of course)	Provide opportunity for instructor feedback, allow instructor to assess student knowledge		Help with time management, help students plan out tasks	
Role playing exercises	Provide opportunity for instructor feedback, allow instructor to assess student knowledge, promote retention, transfer of course knowledge	Tasks, reflections	Multiple opportunities to practice skills learned in course, authentic assessment that allows students to demonstrate knowledge without extensive text or standard tests, present situations relevant and realistic to students	Multiple means of strategic engagement, multiple means of expression

- Gain attention
- Inform learners of learning objectives
- Remind learners of prior knowledge/learning
- Present material clearly and distinctively
- Elicit performance
- Provide feedback
- Assess student performance
- Arrange variety of practice activities

### Gaining Attention

In order for students to learn new material, they must first pay attention to it. Teachers and designers use a variety of techniques to gain learners' attention. Stimulus changes such as sudden visual changes or animation or questions that raise the learners' curiosity or pique their interest are often very effective methods for gaining attention (Briggs, Gagné, & Wagner, 1992). In the course design in this study, a humorous introductory video at the entrance to the course serves this function.

### Informing the Learner of the Objectives

Objectives help the learner understand the purpose and goals of the course. They also help the learner determine what is expected of him or her at the completion of the course (Briggs, Gagné, & Wagner, 1992). This end goal is particularly important for students with dyslexia as it gives them a framework to help them process and understand the new knowledge they are acquiring in the course (Powell, 2003). The course design in this study accomplishes this by

stating the objectives in the web materials for the course and through the rubrics provided for all course assignments and assessments.

### Stimulating Recall of Prerequisite Learned Capabilities

New learning is the combining of ideas, often those the learner has previously learned. Stimulating learners to recall prerequisite or prior knowledge related to the new learning will help give them a framework or foundation upon which to construct the new ideas. With their prior knowledge fresh in their minds, they can more effectively incorporate the new knowledge presented in the course into their pre-existing mental schemas (Briggs, Gagné, & Wagner, 1992). This is accomplished in the introduction video at the entrance to the course.

### Presenting the Stimulus Material

The stimulus material referenced in this event is the material presented to learners to help them achieve the course objectives. The materials should present multiple variations and a variety of examples of the course information. If the examples presented are not diverse enough, the learners may end up with an incomplete or incorrect understanding of the course information (Briggs, Gagné, & Wagner, 1992). Videos, text, and practice exercises present varying viewpoints and applications as well as the general information necessary for students to accomplish the course objectives in the course design in this study.

### Providing Learning Guidance

Providing learning guidance is a more ephemeral and variable event of instruction. Appropriate forms and structures of learning guidance depend heavily on the type of learning

occurring and the needs of the learners. Learning guidance can be anything that supports the learner from breaking a concept into its component parts to giving the learner hints or asking questions to help the learner achieve the course objectives (Briggs, Gagné, & Wagner, 1992). Learning guidance is provided in the course design in the study in the forms of discussion questions, practice exercises, group discussion areas designed to encourage students to collaborate and discuss the course materials, and instructor guidance.

### Eliciting the Performance

If the previous events have been successful, the learner should be able to perform some task or activity to show their comprehension and learning of the new information. Additional demonstrations usually increase in complexity or difficulty (Briggs, Gagné, & Wagner, 1992). In the course design in this study, students are required to demonstrate their learning through the course discussions, group project, and role playing exercises.

### Providing Feedback

Learners must receive feedback on their performances in order to determine how well they achieved the course objectives. Without this feedback, learners may have difficulty fully understanding the concepts they are learning. Detailed feedback helps them refine their understanding and correct any misperceptions they may have (Briggs, Gagné, & Wagner, 1992). Students receive detailed feedback from the completed rubrics used to assess their assignments, discussion responses, and role play exercises. Additionally, they receive feedback from their fellow classmates on their group projects and discussion responses.

## Assessing Performance

The final event of instruction assessing performance allows the teacher to ensure that the learner has truly achieved the desired learning outcome. Assessments can be informal, such as observing the learner perform the desired outcome given different examples during the lesson. They can also be more formal such as an assignment or a test or quiz (Briggs, Gagné, & Wagner, 1992). Performance assessments in the course design in this study are in the form of course assignments, discussion prompts, and a formal final role playing assessment.

## Learning Outcomes

In addition to the events of instruction, Gagné and Briggs (1995) also devised five categories of learning outcomes: intellectual skills, cognitive strategies, verbal information, motor skills, and attitude. Due to the subject matter of the course design in the current study (interpersonal conflict resolution), cognitive strategies will be the greatest focus.

Gagné and Briggs (Briggs, Gagné, & Wager, 1992), referencing their earlier writings (Briggs & Gagné, 1985), describe cognitive strategies as “an internal process by which learners select and modify their ways of attending, learning, remembering and thinking” (p. 66). Bruner’s work explores and emphasize the importance of cognitive strategies in problem solving (Bruner, 1961; Bruner, 1971). Additionally, other researchers have identified many different strategies related to the entire range of the learner’s cognitive processes (O’Neil & Spielberger, 1979).

Weinstein and Mayer (1986) recommend the following types of learner activities for including cognitive strategies in the course design: rehearsal strategies, elaboration strategies, organizing strategies, comprehension monitoring strategies, and affective strategies. Each strategy is further discussed below.



Rehearsal strategies include activities like highlighting important ideas and concepts in text materials, which is possible with the pdf text materials included in the course. The course design also includes several role playing practice scenarios which give students opportunities to practice the skills and knowledge presented in the course. Additionally, the materials are presented in a variety of formats to allow students the opportunity to review the material multiple times and still remain engaged. In addition to the pdf text materials, the course also includes videos and web based materials.

Elaboration strategies include paraphrasing, summarizing, and note taking. The discussion prompts in the course design require students to paraphrase and summarize course materials. Additional discussion prompts also require students to describe and compare course concepts, which are examples of organizing strategies. The group assignment in the course requires students to locate an appropriate scenario in a movie, analyze it and then rewrite it using the techniques in the class. Each group then performs their rewritten scenario for the rest of the class, which is followed by a class discussion and constructive critique of the rewritten scenario.

Organizing strategies control how the course and materials are arranged. The organizing strategies employed in the course design are more free form and modular than linear and controlled. The materials are grouped together by topic, in physical proximity to each other. The module designed for the study contains four sub topics. All of the materials for each sub topic are located next to each other in the design. Additionally, all of the course materials are located in one central place in the design around the Tree of Knowledge in the center of the garden (Briggs, Gagné, & Wagner, 1992). However, the sub topics were designed to be modular so students can access them in any order without sacrificing understanding of the course content.

The assignment rubrics throughout the course provide support for comprehension monitoring, or metacognitive, strategies which relate to the goals students set for their own learning and how they monitor their progress toward those goals.

Affective strategies help learners remain focused and engaged, control anxiety, and effectively manage their time. The interactive and highly visual nature of the Second Life environment is intended to help learners remain engaged with the course materials. Additionally, the videos in the course material will help with this as well. The garden design of the course was created to help reduce any anxiety students with dyslexia may feel in a classroom environment due to past stressful experiences (Aldridge, 1995). To further reduce anxiety and help with time management, all of the assignments and assessments in the course are evaluated using rubrics. The rubrics are available to the student from the beginning of the course. A course calendar also lists all major deadlines and milestones throughout the course. These two elements will allow students to more easily plan their time and efforts for the whole course.

One of the factors that makes the Gagné and Briggs model suited to the current study is the model's focus on learner characteristics and how they affect learning. This learner centeredness ties into the fundamental theory of the model that instruction is a series of external events that effect internal processes within the learner. The authors state in their *Principles of Instructional Design* (Briggs, Gagné, & Wagner, 1995), "For these and other learner characteristics that are genetically determined, instructional design cannot have the aim of altering these qualities by means of learning. Instead, instruction must be designed in such a way as to *avoid exceeding human capacities*" (p. 100). They go on to state, "Human abilities are likely to affect new learning by contributing strategic techniques of processing the learning task and its material" (p. 111). For populations of students with special needs, such as students with

dyslexia, this concept is extremely important. These students may have different human capacities than students not in those populations. Consequently, instruction for these students should be designed so that the learning expected of them is not outside their human capacities.

Gagné and Briggs call upon the work of Corno and Snow (1986) to advise instructional designers and instructors on how instructional design can take learner abilities and traits into account. Corno and Snow (1986) suggest two approaches that include circumventing deficient abilities and aptitudes or developing abilities and aptitudes that appear to be deficient in the learner. They state the first approach is more accessible, with the second approach often taking extensive instruction and practice in cognitive strategies. One of the main purposes of the current study and the course design therein is to attempt to design a course that circumvents many of the common deficiencies that students with dyslexia have in comparison to their non-dyslexic peers.

Another factor that makes the Gagné and Briggs model suitable for the current study is the importance of student motivation in the model. The authors chose to use Good and Brophy (1990) definition of motivation, "...a hypothetical construct to explain the initiation, direction, intensity and persistence of goal-directed behavior" (p. 360). Learner motivation is a major factor in instruction methods for students with dyslexia. Fink's (1998) research, discussed in detail below, discovered that students with even the most severe dyslexic difficulties can overcome those difficulties if they are sufficiently motivated to persist in their struggles to read and learn. The course design in the present study will incorporate several elements to help motivate students, such as multi-media learning materials and the interactive elements of the Second Life environment.

## Constructivist Learning Design

The constructivist learning design (CLD) model is based on the constructivist learning theories proposed by Jean Piaget (1976) and Lev Vygotsky (1934) who believed that students actively construct their own knowledge rather than passively accepting knowledge transferred to them by teachers (Collay & Gagnon, 2006). Piaget's (1976) theories focused on the personal construction of knowledge and how the experiences students gain over their lives effect their knowledge construction. Vygotsky (1934) concentrated on the social aspects of meaning construction and learning. He believed people, being social creatures, learn more effectively when they can work together and use each other's personal knowledge construction to collectively construct meaning. According to constructivist learning theory, students "make personal meaning for themselves, discuss social meaning in peer groups, decide on shared meaning with other students in class, and then reflect on the standard meaning as they consider their thinking and learning with the teacher" (Collay & Gagnon, 2006, p. xiii). Rather than thinking of instruction in terms of teaching information to students, teachers and designers using constructivist theory think in terms of creating situations to support the learner and help them create meaning. These concepts form the foundation of the CLD model. According to Gagnon and Collay (2006):

Constructivist Learning Design is grounded in a formal system of philosophy: Knowledge is composed of patterns of action; learning is the process of creating these patterns; and teaching is supporting students to construct their own meaning. Teachers as learners can embrace the belief that education means to draw out rather than to put in. A teacher's role must then focus on organizing for student learning rather than planning for teacher telling. (p. xvii)

The CLD model consists of six elements: a) situation, b) grouping, c) bridge, d) tasks, e) exhibit, and f) reflection. Each of these is discussed in more detail next.

## Situation

The situation element sets the stage for the other five elements. In developing a situation element, an instructor or designer must first choose a topic for the situation. Topics are concepts, processes, or attitudes that require students to collaborate and use their real-world experiences to accomplish. Situations can take any format that engages learners in active exploration and meaning construction, for example problems, questions, essays, puzzles, etc. The primary purpose of the situation is to present the purpose of the learning episode to the students. Consequently, the other elements will be driven by the situation element.

## Grouping

Grouping is a very important element in the CLD model as well. Students and materials are grouped into small groups to encourage active collaboration and social meaning construction. These small groups are also intended to mimic the kinds of work environments students are likely to encounter when they join the work force.

## Bridge

Bridge elements serve to activate students' prior knowledge, skills, values, motivations, and expectations. As the authors state, "Before any new learning can take place, learners must revisit their prior knowledge, surface conceptions and misconceptions, and make connections to real life experiences" (Collay & Gagnon, 2006, p. 86-87). Instructors and designers are also cautioned to ensure they determine what students actually know, including erroneous information and misconceptions, rather than assuming they understand the knowledge their students bring with them. Effective bridge elements engage students to activate their prior

knowledge by encouraging them to “freely describe their thinking and understanding with reservations about being right or wrong” (Collay & Gagnon, 2006, p. 88).

## Tasks

Tasks are the keystone of the CLD model. These elements are activities requiring higher level thinking and problem solving skills that maintain a “delicate balance of frustration and challenge” (Kumar, Liu, & Scott, 2010, p. 428). Tasks are essentially the learning tasks that students complete throughout the learning episode that guide them to construct meaning for themselves and with each other. “A good task is open ended and encourages students to think together as they construct their own shared meaning about a topic” (Collay & Gagnon, 2006, p. 115).

The authors list the following characteristics of tasks (Collay & Gagnon, 2006, p. 124):

- A task is interesting to the student
- A task can be broken down into smaller parts
- A task has an understandable outcome
- A task leads to learning new content
- A task results in a product
- A task provides opportunities for teacher and student questions

Gagnon and Collay draw from the work of John Dearn (1996), specifically his statements about learning, in further explaining the importance of constructing tasks the encourage students to actively question and explore the topic and that relate to students’ experiences and interests. They quote two of his statements, “Students learn when they are motivated to ask questions that they perceive of as valuable and relevant to their goal...Students construct knowledge while they

are engaged in authentic tasks” (Dearn, 1996 as cited in Collay & Gagnon, 2006, p. 131). Dearn further explains his statements, “In order to learn students need to apply their knowledge and gain confidence in using it. Knowledge that is not put to use will not be learnt and students need to be engaged with practicing rather than studying, which is usually equated with memorizing” (Dearn, 1996 as cited in Collay & Gagnon, 2006, p. 131).

The CLD model also incorporates Jane Vella’s (2001) beliefs about students and learning (Vell, 2001 as cited in Collay & Gagnon, 2006, p. 130):

- Students have the capacity to learn
- Students learn when they are actively engaged
- New content can be learned through learning tasks
- Learning tasks promote accountability

The authors present Gary Flewelling’s ideas on providing “rich learning tasks” (Flewelling & Higginson, 2002, p. 130) to further explain the Task elements in the CLD.

According to Flewelling, a rich task is one that gives students opportunities to (Flewelling & Higginson, 2002, p. 130):

- Use (and learn to use) their knowledge in an integrated, creative, and purposeful fashion to conduct inquiries, investigations, and experiments and to solve problems and in so doing
- Acquire knowledge with understanding, and in the process
- Develop the attitudes and habits of a life-long sense maker

## Exhibit

The exhibit element is intended to make the students’ learning and thinking visible to the

teacher and to the other students. According to Meier (1995), the social construction of knowledge requires that students show other students and their teacher what they know and share what they are thinking about what they have learned. As Gagnon and Collay (2006) state,

Without this opportunity to temper thinking in the fires of consideration by others, the strength of new learning is limited. Only through a public vetting of work do students connect individual and small-group learning to greater community- or culturewide understandings or common meanings (p. 136).

Exhibits also serve as an assessment of the students' learning and understanding. The authors of the model strongly encourage authentic assessments instead of the more traditional approach of asking students questions and expecting them to produce the correct response through memorization or rote learning. They argue that the more traditional approach does not communicate to students that their thinking is important (Collay & Gagnon, 2006). Further, students must learn to think critically and communicate their ideas through the use of the Exhibit element (Collay & Gagnon, 2006). The authors of the model strongly encourage the use of collaborative group projects that culminate in class presentations and peer review. They believe that students and teachers are unable to "engage in and learn from this fundamental social process of framing and explaining" (Collay & Gagnon, 2006, p. 137) if the learning process remains internal and private. Finally, the exhibit element can be structured to value and encourage creativity and divergent thinking (Collay & Gagnon, 2006), which could be very beneficial to dyslexic students by allowing them to express what they have learned in ways that work with their strengths instead of being hampered by their weaknesses (Powell, 2003).

## Reflection

The final element, reflection, is strongly emphasized in the CLD model. The reflection element contains both individual and collective reflection. For example, the class discussion at



the end of the exhibit element could be part of the collective reflection for the reflection element. Similarly, asking students to write journal entries or write a letter as the main character of a story to another character in the story constitutes individual reflection. Reflection allows teachers to assess, document, and correct or redirect students' individual constructions of meaning from the learning episode. It also allows them to better assess student understanding, thus allowing them to tailor construction of future lessons to the needs of their students or to revisit concepts presented in previous lessons that were not retained by the students. Students are also encouraged to consider their thinking and understanding through reflection activities. They can then revisit their thinking later after the learning episode.

Finally, the reflection element helps provide a framework for teachers to help them hear and understand what their students say about what they have learned. Gagnon and Collay (2006) feel this is critical to learning, stating, "Students need a chance to say what they learned --- if they can't, then the learning is incomplete" (p. 184). The authors include the following quote in their concluding remarks about reflection and the CLD model:

Experience has shown that expectations breed success. When you perceive students as knowledgeable and able contributors, they will contribute. When you talk about those contributions and talk about their goodness, students are more likely to feel successful as learners. Feelings of success are simple yet elusive. Students learn something from every exchange, and they will tell you about their learning if you ask them. Together, teacher and students can structure learning experiences that result in fluent and diverse Reflection on new knowledge. (Collay & Gagnon, 2006, p. 184)

### Universal Design for Learning (UDL)

The concept of universal design originated in architecture in the early 1970s and gained popularity in the 1980s and 1990s (Chodock & Dolinger, 2009; Rush & Schmidt, 2009). The term universal design is accredited to Ronald Mace, an architect who pioneered the development

of accessible architecture and industrial products (Center for Universal Design, 2007; Chodock & Dolinger, 2009). At its most fundamental, universal design strives to create environments that are inherently accessible to a wide variety of people with a wide variety of needs without the need for special accommodations (Center for Universal Design, 2007; Izzo, Murray & Novak, 2008; Rush & Schmidt, 2009). In architecture, this is expressed with elements such as curb cut outs, ramps, and automatic doors. These elements allow people with physical impairments to more easily navigate. However, they are also useful to people without impairments, such as delivery people pushing carts or parents with strollers (Fox & Johnson, 2003; Rush & Schmidt, 2009).

As universal design became more accepted in architecture, educators began adapting the concepts to design more inclusive learning environments that require, ideally, little or no accommodations to meet the needs of students with various disabilities (Center for Universal Design, 2007; Hinson & Simoncelli, 2008; Izzo, Murray & Novak, 2008; Rush, Schmidt, 2009). Students with disabilities have traditionally been provided with materials designed for students without disabilities (Sapp, 2009). According to Boone and Higgins (2007), students who do not receive learning materials that met their learning needs face additional challenges to their academic progress. However, as shown by multiple studies, the educational methods and options that allow students with various disabilities to be academically successful also benefit students without disabilities (Field, Goldberg & Joyce, 1998; Gambrell, Koskinen, Neuman & Wilson, 1993; Hodge & 1998; King, 1993; Koskinen & Neuman, 1992; Otto & Pusak, 1996; Rothberg & Wlodkowski, 2000; Shea, 2000). As Chodock and Dolinger (2009) explain, "...universally designed curricula make it possible for students to have full access to course content despite physical limitations, learning disabilities, behavioral problems, or language barriers" (p. 26). A

number of models adapting universal design principles to education have been developed since 2000 including universal design for learning (Rose, 2001; Abarbanell et al., 2008; Meyer & Rose, 2000), universal design of instruction (Burgstahler & Cory, 2008; McGuire, Scott & Shaw, 2001, McGuire et al., 2003), and universal instructional design (Bourke, Silver & Strehorn, 1998). The course design in this study incorporated elements of the universal design for learning (UDL) model because it was the model Hinson and Simoncelli (2008) used in their study of personal reactions of college students with learning disabilities to online learning. Additionally, UDL is supported by extensive empirical research (Basham et al., 2010; National Center on Universal Design for Learning, 2009) as well as being specifically defined in the Higher Education Opportunity Act of 2008:

The term Universal Design for Learning means a scientifically valid framework for guiding educational practice that (A) provides flexibility in the ways information is present, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged; and (B) reduces barriers in instruction, provides appropriate accommodations, supports, and challenges, and maintains high achievement expectations for all students, including students with disabilities and students who are limited English proficient. (HEOA, 2008, 122 STAT.3088)

The Center for Applied Special Technology (CAST) was one of the pioneers in adapting universal design principles to education, developing universal design for learning (UDL) (Chodock & Dolinger, 2009; Izzo, Murray & Novak, 2008). As Basham et al. (2010) state, “universal design for learning (UDL) addresses needs of students by proactively planning for instructional, environmental, and technology support to all students to effectively access and engage in instruction” (p. 243). Though UDL was originally designed for K-12 education, CAST has since expanded the UDL principles to higher education (Zeff, 2007). UDL, as explained by CAST, consists of three basic principles: multiple means of representation and presentation,

multiple means of strategic engagement, and multiple means of expression (Rose & Meyer, 2002; Sopko, 2008; Stahl, 2003).

#### Multiple Means of Representation and Presentation

Multiple means of representation and presentation refers to incorporating multiple modes of teaching and employing a mixture of media such as lectures, videos, audio recordings, and group discussions. The course design in this study incorporated text, videos, and group discussions.

#### Multiple Means of Strategic Engagement

Multiple means of strategic engagement refers to making content relevant and accessible and motivating students to interact with the course materials and activities. In this study, the course design incorporated an interactive and engaging environment. Additionally, the scenarios presented in the materials were relevant and accessible to the participants.

#### Multiple Means of Expression

Multiple means of expression refers to incorporating multiple and varied opportunities for students to demonstrate their understanding of the course material. The study course design incorporates a group project with a written component and a role playing component, discussion prompts, and an individual role playing exercise that serves as a final assessment.

### Accommodating Learning Disabilities in Online Learning

There are many instructional manuals available to help those instructional designers an

instructors who are developing and implementing web based classes. They cover such subjects as translating traditional classes into the web format (Van Dusen, 2000; Horn & PytlikZillig, 2003), working with the technology necessary to successfully design and deliver a web based class (Raskind, 1998; Mayer, 2001), administration issues, and student support issues (American Council on Education, 1995; Lissner, 1997; Edgar et al., 2000; Scott, 1997). Some sources take a more theoretical approach to presenting this information (Clark, 2003; Mayer & Moreno, 2000; Scott, 1997; Nightengale, 1991); others are more practical instructional manuals (Powell, 2003; Lehman et al., 2001; Mayer, 2001; Vogel, 1998; Kavale, 1988).

Some sources tackle the topic of how to adapt online learning to meet the needs of students with physical disabilities, especially in the course design. Picciano (2001) suggests those designing web based courses must think about design considerations from both the students' and instructors' points of view for the course to be successful. The World Wide Web Consortium (W3C) (W3C Standards, 2010) developed a set of accessibility guidelines to help web developers ensure their pages are viewable and usable for people with all types of physical disabilities. These guidelines are some of the most complete and explicit available, though they are still a work in progress (W3C Standards, 2010). In an April 14, 2004 W3C Web Accessibility Initiative (WAI) report, testers in the UK determined that the guidelines at that time addressed 75-80% of known accessibility issues for users with physical disabilities (W3C, 2004). They further reported that the remaining accessibility issues will be more easily addressed as adaptive technology innovations and upgrades become available.

Powell (2003) developed his own principles for software and online accessibility. These principles are much more compact and general than the guidelines developed by the W3C.

Powell (2003) warns that the practical applications of these principles are greatly affected by the authoring tools, programming language, and development environment used.

Following are Powell's (2003) general principles of software accessibility:

- Allow for user customization (particularly of text size and style, background and foreground colors)
- Provide equivalent visual and auditory content and interface elements (text descriptions for images and video, transcription of auditory content, text labeling of interface elements)
- Provide compatibility with assistive technologies
- Allow access to all functionality from keyboard alone (so that the software can be fully used without a mouse)
- Provide context and orientation information. (Support efficient navigation by informing users of where they are in a way that takes into account that some users may be using screen-readers (p. 47)

Some instructional designers and web developers believe that incorporating many visual and auditory elements into a web page will help learners (Beer, 2000). Research shows (Clark, 2003; Craig, 2002; Mayer & Moreno, 2003; Mayer, 2001) that this can actually be detrimental to learning. Moreno and Mayer (2003) found that students are often overwhelmed by irrelevant distractions and the effort of processing redundant information. According to Clark (2003), web pages with heavy text or those that separate visual elements from their text-based explanations tend to overload students' working memory, which is an even larger problem for students with learning disabilities. In 2001, Mayer found that adding audio narration to printed text on the screen also caused a working memory overload for students. Craig (2002) and colleagues replicated Mayer's findings in 2002, including the discovery that students learn information better when it is presented in narrated form without pictures or text than when it is presented as a printed version of the narration.

A few authors have tackled the issues surrounding instructional design for students with

learning disabilities (Powell, 2003; Deci & Ryan, 2000). Powell (2003) cautions instructional designers not to “dumb down” content intended for students with LD. Studies have shown that these students find simplistic tasks very unmotivational. These tasks fail to promote complex cognition. They can also put LD students at an even higher risk of failure by boring them and failing to meet their needs for autonomy and higher levels of valued competence (Deci & Ryan, 2000). However, some instructors and instructional designers persist in giving them endless tasks that require only the lowest levels of cognition (Agran, Copeland, King-Sears & Wehmeyer, 2003). These instructional practices often rob dyslexic students of opportunities to develop analytical reasoning and self-directed learning skills (Agran et al., 2003). Other studies suggest that this practice may negatively impact teacher-student and student-student interactions which could, otherwise, help with motivation and learning (Bruning, Horn, Kauffman & PytlikZillig, 2003; Bruning, Horn, Lehman, Kauffman & White, 2001). Instead, Powell (2003) insists, these students should be challenged intellectually. The difficulty lies in balancing a sufficient level of intellectual challenge with the need to stimulate the students without overwhelming them. Bruning et al. (2001; 2003) suggests that the use of technology and computers can be motivational to some LD students. Tiene and Ingram (2001) state that computers are also helpful for LD students as they allow the students to revisit information as often as necessary for understanding, without embarrassment.

## A Second Life Course Design for Review by Dyslexics

### Overview of Course

According to Morgan (Klein & Morgan, 2000; Morgan, 1996), dyslexics are often visual learners who also see success with tactile-kinesthetic approaches to learning. Second Life’s rich

visual and interactive environment provides the opportunity to present course materials the students can not only see but also physically interact with. To allow participants greater control over how and when they access them, course materials are presented in slide shows and web pages embedded in viewing screens and as PDF files (apples) that can be picked up and downloaded as well as videos placed around the communal areas of the garden, or course environment, as recommended by Powell's key learning needs of dyslexic students discussed above (Powell, 2003). Presenting the course materials in multiple modes allows students to access the information in a format other than text, as reading and understanding text is usually very difficult for dyslexic students (Fitzgibbon & O'Connor, 2002; Morgan, 2000; Morgan, 1996;). Figure 7 shows one of the viewing screens available in the course.



*Figure 7.* Viewing screen area.

Visually, the course resembles a garden rather than a traditional classroom in the hopes the garden environment is less likely to trigger memories of “painful or fearful classroom experiences” (Aldridge, 1995, p. 110) than a traditional classroom environment for the participants, thus allowing the participants to be more successful in understanding the course materials (Powell, 2003). Figure 8 shows an overhead view of the course area.





*Figure 8.* Course area in Second Life.

### Course Structure

The garden is divided into communal areas and private group areas. The communal areas are designed to promote interaction and collaboration between participants. They also contain all of the course materials. Figure 9 shows the social fire pit area which is a communal area for students to interact informally with each other.



*Figure 9.* Social fire pit area in the communal course area.

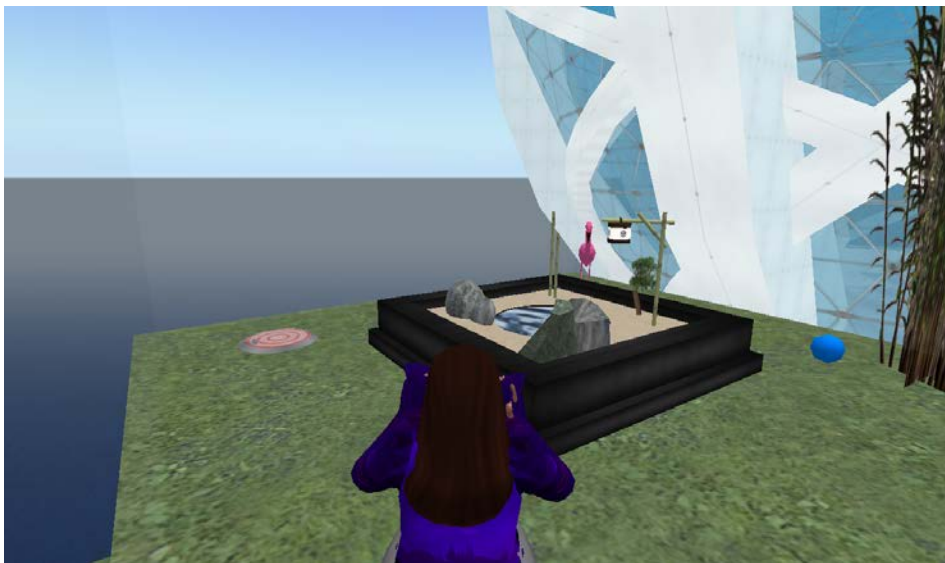
The private areas provide less distracting spaces for students to work in pairs or small groups (Powell, 2003). They are also be available for students to work through the role playing exercises in the course to practice the skills and knowledge they learn in the course (Powell, 2003). The private group areas are placed apart from each other so that groups can use the voice communication feature to interact with each other without disturbing or distracting other groups, as extra distractions can cause difficulty for dyslexic students (Powell, 2003; Fitzgibbon & O'Connor, 2002; Morgan, 2000; Morgan, 1996). The voice communication feature in Second Life is designed so that participants can only hear others that are near their avatars. Figure 10 shows the larger group meeting area in the course, and Figures 11 and 12 show the two smaller private study and group meeting areas.



*Figure 10.* Group meeting area.



*Figure 11.* Private practice/study area.

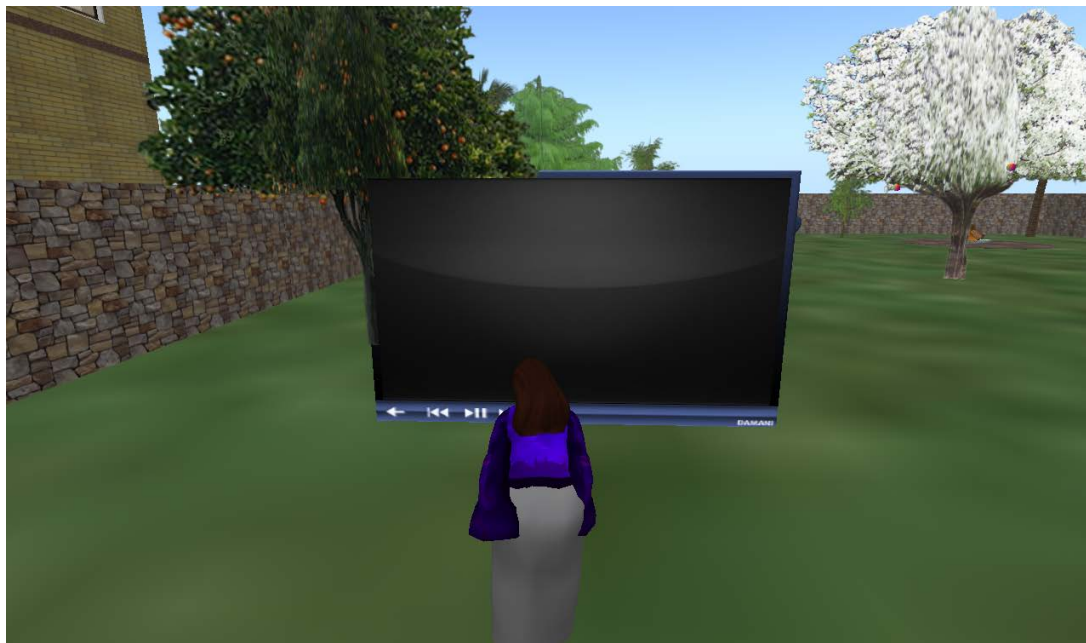


*Figure 12.* Private practice/study area.

The course design incorporates instructional, navigational, and organizational strategies designed to minimize the difficulties dyslexic students often experience in higher education classes while simultaneously attempting to capitalize on their strengths. Additionally, it incorporates Gagné's events of instruction (Briggs, Gagné & Wager, 1988), Powell's key learning needs of dyslexic students (Powell, 2003), Ganon and Collay's constructivist learning

design (2006), and elements of universal design for learning (Chodock & Dolinger, 2009; Izzo, Murray & Novak, 2008).

In order to gain the learners' attention, students encounter a humorous video of two avatars role playing an interpersonal conflict at the entrance to the course area. The learning objectives for the module are presented on the course homepage, in keeping with informing the learner of the module objectives, Gagné's second event of instruction (Briggs, Gagné & Wager, 1988). This video concludes with a brief tour of the garden and tips to help students navigate the course interface and materials. Figure 13 shows the entrance to the course with the video screen that plays the introduction video.



*Figure 13.* Video screen at entrance to course area.

## Course Materials

Many dyslexic students have difficulty reading and understanding text, especially large sections of text (Fitzgibbon & O'Connor, 2002). Consequently, course materials are chunked



into web pages, presenting only one or two ideas about the subject matter, which can be read without scrolling. Larger text and white space help to make the text more readable. Students with Scotopic Sensitivity Syndrome, a separate disorder that affects approximately 50% of dyslexics (Irlen, 1991), are often able to better read and understand text if it is not presented as black text on a white background. The most effective color combinations of text and background colors are personal to each student (Irlen, 1991). Because of this, text based materials will also be available in accessible PDF format to allow students who have difficulty reading text on a computer screen to download them and print them off on any color paper that is helpful to them.

In order to stimulate the recall of prerequisite learning (Briggs, Gagné & Wager, 1988) each chunk of material begins with a brief reminder of the key concepts and ideas the learner needs to understand the material. Text materials visually resemble fruit hanging from the Tree of Knowledge in the center of the course common area. Students simply click on, or, in the terminology of the Second Life interface, touch the objects to access the text. Figure 14 shows the Tree of Knowledge in the center of the course.



*Figure 14.* Tree of knowledge in common area.

Course materials are also presented in multiple formats. For example, the main points presented in the written materials are also presented and further expanded in PowerPoint presentations as well (Powell, 2003). External materials, such as YouTube videos and relevant websites, are also linked into the course to further enhance the course materials. All related material is placed together in the course design. As this is a test design, only one topic is presented. In a full presentation of the design, the garden will be larger and will be divided into sections, each containing one topic or module of course material.

### Course Navigation

Control of their own learning is believed to be extremely important to the academic success of dyslexic students (Morgan, 1996; Morgan, 2000; Powell, 2003). As many dyslexic students need to be able to revisit materials multiple times in order to fully understand them, the course is arranged so that participants can move through the course materials in any order they wish and revisit them as often as they need (Fitzgibbon & O'Connor, 2002; Morgan, 1996; Powell, 2003). In order to provide learning guidance (Briggs, Gagné & Wager, 1988; Powell, 2003), signposts and navigation aids, such as unmanned avatars that can answer student questions (help bots), signs, and items scripted to automatically chat with the students when they are in proximity to them, are placed throughout the course design to help ensure that students are not frustrated or lost in the design.

### Practice and Assessment

Dyslexic students frequently need motivation to continue struggling with text long enough to understand it (Fink, 1998). In a live instance of this course design, the course

instructor will post and monitor discussion prompts and case studies on the course bulletin board to help guide students' understanding of the course concepts. Both the discussion prompts and the case studies will be graded exercises, though the discussion posts will be worth a smaller percentage of the total points available for the course than the case studies. These discussion topics were created to encourage the students to interact with each other and the materials. The discussion topics also present students with more opportunities to practice their writing skills in smaller, less overwhelming chunks than full-length papers. In the course design in the study, the discussion prompts and case studies are available to students, but no instructor is available to grade the responses or guide the discussions. However, the rubrics an instructor would use to grade the all assignments and assessments in the course are posted in the current design. Additionally, these prompts and case studies allow the student to perform the concepts learned in the module, thus allowing the instructor to provide feedback and assess the learner's performance, Gagné's fifth, sixth, seventh, and eighth events of instruction.

Practice role-play exercises are posted in the course so that students can practice their skills with each other (Powell, 2003). In a live course, the final assessment for the module will require that students demonstrate their knowledge and understanding of the course objectives by completing role-playing exercises with the course instructor. The role-playing exercises are derived from real life scenarios the students are likely to face (Powell, 2003). Though there is no instructor for the current iteration of the course, the rubric an instructor would use to grade the role-play exercises is posted in the current design. This satisfies Gagné's assessing the learners' performance and promoting retention and transfer of course knowledge instructional events (Briggs, Gagné & Wagner, 1988).

## Time Management

Many dyslexic students struggle with time management and completing unfinished tasks (Fitzgibbon & O'Connor, 2002). Completing tasks and sequences is often easier if the student knows how the tasks fit into the larger context and how they relate to other tasks and sequences (Morgan, 1996; Morgan, 2000). To help with these difficulties, a Course Calendar, populated by the instructor with dates and milestones throughout the course, is available from the course webpages. Additionally, all course tasks and grading rubrics are presented at the start of the course. These elements also satisfy Powell's (2003) recommendation that students be allowed to plan out their tasks in the course and be given time to figure out how to perform a task. The rubrics allow the students to see which elements of the assignments are most important, thus allowing them to budget time and effort more efficiently.

This chapter has presented information to help the reader form a foundation and framework to better understand the current study and subsequent findings. The major topics of discussion contained in this chapter have been the difficulties and learning needs of dyslexic students, an overview of online learning, and the discussion of Gagné and Briggs and the constructivist learning design instructional design theories. Finally, the experimental Second Life course design created for the study was described. In the next chapter, the research methods for the study are discussed in detail.



## CHAPTER 3

### METHODOLOGY

This chapter provides information on the methodology utilized in this research. It includes descriptions of the research design, data collection, and analysis procedures. This chapter also describes the special population for the study and recruitment procedures. Methods used to ensure participant privacy are explained. Finally, the study report is discussed.

#### Background

In response to the current need for scholarly research (Alty et al., 2006; Browne, Covington & Davila, 2004; Griffiths, Hatcher & Snowling, 2002) concerning how to improve online education for students with dyslexia, this research investigated the potential of virtual environments for course delivery. The research conducted used an existing course segment on a single module of an intro to communications course, specifically interpersonal conflict resolution delivered using Second Life, that was tailored for students with dyslexia using common methods to improve it for this special needs community (see Chapter 2). The study sought to understand if the design modifications used in the course segment in combination with the unique elements available in a virtual environment minimize the difficulties students with dyslexia enrolled in higher education often experience in online classes. The study utilized structured surveys, semi-structured interviews, and observations. The mixed-method design allowed for the collection of much richer data than a quantitative design would allow (Berg, 2004; Creswell, 1994), thus presenting a more complete picture of whether design elements meet the needs of this special population. These methods allowed for the triangulation of research, helping to richly describe a multi-dimensional picture resulting from multiple forms of data.

## Research Setting

The research setting took place in two spaces. The survey portion of the study was conducted via an online survey provider. The results of the online survey were used to select participants to complete the observation and interview phases of the study (see section on sampling procedures below). The research setting, after the survey, for the observation phase of this study was a private island, a unit of virtual land, in Second Life (Linden Labs, 2010). The course design that the purposeful sample participants evaluated was housed on an educational island with restricted access. Observations were conducted in a lab setting where each participant individually explored and evaluated the course design while I observed from a separate location. The interview phases were conducted face-to-face except for the follow-up interviews with two participants that were conducted over the phone.

## Participants

The population of this study was composed of student volunteers from an emerging research university in the southwest. All participants were currently accepted students at the university at the undergraduate or graduate level and were older than 18 years of age. Participants were accepted for the study regardless of gender, religion, ethnicity, or country of origin. Prior to the start of the study, I submitted all the procedures outlined below to the Institutional Review Board for approval. Upon approval, students were recruited via electronic mail through the university's Office of Disability Accommodation. Additionally, a professor in the Sociology department announced the study in a large enrollment online course. The instructor offered extra credit to students who completed the online survey portion of the study. The instructor also offered equivalent extra credit opportunities to students who did not want to

participate in the study. The purpose and methods of the study were fully disclosed to the participants prior to their involvement in the study. Participants completing the survey agreed electronically to the standard informed consent notice accompanying the survey (see Appendix A). Additionally, all participants were allowed to quit the study at any time.

Those students selected to participate as part of the purposeful sample were entered into a drawing for a \$50 gift card. Those that successfully completed the research study were eligible for the gift card. An additional signed informed consent was obtained from each participant involved in the last two stages of the research at the time of the observation stage of the research. This additional informed consent covered how participant confidentiality would be maintained and discussed possible risks. It also explained again that they could leave the study at any time (see Appendix B).

To help protect participants' privacy, those who participated in the second and third stages of the study were assigned a participant number and pseudonym for the study. Only I had access to their real names. The real names of the participants were recorded for consent purposes only. Additionally, I had sole access to the data files. Results of the study are reported so that no personal or sensitive information is revealed about any participant in the study.

### Sampling Procedure

The student recruitment for the study resulted in 92 students completing the online survey. From the completed survey responses, a group of 14 was selected to participate in the purposeful sample. These 14 participants were selected from the 92 total participants using maximal variation sampling (Creswell & Clark, 2007). In purposeful sampling, participants are selected based on their experiences with the phenomenon being explored. The use of maximal

variation-sampling selects participants who have differing and sometimes unique perspectives on the phenomenon the researcher is examining. Consequently, their different views help provide a better triangulation of the data being examined as well as a broader explanation or description of the central concept of the study (Creswell & Clark, 2007). In this study, the purposeful sample was based on the participants having or not having dyslexia, age, gender, Second Life experience, field of study, experience with online classes, and experience playing video games with the primary purpose of representing as broad a cross section of the population that had initially participated in the study as possible.

Only 11 participants indicated that they had dyslexia. All of these participants were invited to complete the remaining phases of the study. Five of the 11 participants with dyslexia initially agreed to complete the observation and interview phases of the study, but only three of the five that started the study completed the research. The other five participants of the purposeful sample represented participants without dyslexia, but meet the requirements of the maximal variation-sampling. A total of eight participants participated and completed the observation and interview phases of the research.

#### Methods and Procedures for Data Collection

The study consisted of three data collection stages. The first was an online survey that all participants completed. After the survey, the purposeful sample of participants was created and contacted. These sampled participants were involved in a second interaction that consisted of an online observation followed by an interview. The sampled participants then participated in a third stage that consisted of a follow up interview.

## Survey

The online survey was comprised of open and closed ended questions (see Appendix C). The survey was organized into the following sections: a) classes/schoolwork, b) dyslexia/learning disabilities, c) online classes, d) online and gaming experience, and e) demographics. The classes/schoolwork section asked participants to describe any difficulties they experience in their classes and schoolwork. This section also asked them how those difficulties differ if the class is online instead of a traditional face-to-face class. The dyslexia/learning disabilities section asked participants whether they are dyslexic, how long they have known, and the types of accommodations they have received in school. The online classes section asked how many online classes the participants have taken and how those classes were delivered, as in Blackboard or other technology-based learning environments. The online and gaming experience section began with questions about participants' overall experience with computers and then moved into questions about their online activity and experience with video games. This section was intended to help determine if participants might have unexpected difficulty with the Second Life environment due to lack of computer skills or experience with online or gaming environments. The survey collected data for the purpose of helping me understand the difficulties participants experience and their experience with both online learning and environments similar to Second Life before they explored and evaluated the course design.

## Observation

The observation stage took place after the survey was completed. Participants that were selected and agreed to participate in the next two stages individually explored and evaluated the course design in Second Life to see how well it met their needs as learners in higher education. I

began each observation session began by encouraging participants to again review the informed consent form concerning the potential risks of the study and how to exit the study. Also, any questions the participant had before starting were answered. I also explained how the observation would be recorded and that there were no cameras or additional recording devices in the lab before beginning the observation session. Each interview also began with a recorded statement of consent from the participant.

To minimize and remediate any technical problems participants could face, I provided a computer with Second Life already installed and helped participants get successfully logged into the course module at the start of the observation session. Avatars were created in Second Life for each participant prior to the observation session. I also ensured the recording software used to record all observations was working properly. Once these steps were completed, I left the room and logged into the course module from another computer in a separate room to observe the participant. This was intended to minimize any influence I might have on the participant during the observation. An introduction video provided participants with basic navigation and interaction instruction at the entrance to the course design. My avatar was seated in an unobtrusive area of the course in order to answer any questions the participant had as well as observe the participant.

I used an observation form to record field notes about each observation session (see Appendix D). The observation form was developed based on the following research questions:

- Navigation- did the participant have trouble finding course materials and/or help?
- Did the participant seem lost or unable to figure out how to start or what to do next?
- How much time did the participant spend exploring the course?
- Did they seem interested and/or engaged with design?

- How did the participant interact with the various types of course materials?
- How did the participant interact with other avatars in the course area?

The form was divided into five columns: student interest and engagement, interaction with course materials, interaction with course elements, human interaction, and course navigation. I recorded observed behaviors, including any spoken or typed comments or questions, in the appropriate column along with reflective notes about the behavior, emerging themes, and any concerns that arose during the session (Creswell & Clark, 2007). Examples of student interest and engagement behaviors included participants clicking on objects in the environment, walking around and exploring the environment, and any spoken or typed statements of engagement or interest during the observation. Examples of interactions with course materials behaviors included reading text-based materials and viewing videos within the course. Examples of interacting with course elements included posting comments on the discussion boards, exploring the group study areas, exploring the private study areas, and exploring the role play practice areas. Examples of human interaction include interacting with the two bot avatars in or I in the course area during the observation. These interactions included talking, chatting, walking toward another avatar, and many preprogrammed actions such as waving, dancing, bowing, singing, etc.).

## Interviews

An initial interview was conducted immediately following the observation session. An interview form was used for each interview to ensure all interviews were structured the same and the same basic questions were asked of each participant (see Appendix E). The semi-structured interview (Berg, 2004), including predetermined questions and probes as well as ad hoc

questions prompted by the participants' responses and comments, asked the participants' opinions of how well the course design addressed their learning needs. More specifically, participants were asked if they found any part of the course distracting, if the course materials were easy to understand, if they had any difficulty navigating through the course, if they had any problems with the course, if they felt any problems they had with the course were caused or exacerbated by their dyslexia, what they liked and disliked about the course, and what they would change about the course. I used a semi-structured interview form (see Appendix E) to record participants' answers to questions as well as ad hoc questions and responses (Creswell & Clark, 2007). Additionally, all interviews were digitally recorded as a backup to my written notes. Semi-structured interview questions used in this research included the following examples:

- What was your overall thought about the design of the course?
- Probes: did you have trouble navigating through the course?
- Did you find any parts of the design distracting?
- Probes: Colors? Images? Layout? Organization?
- Did you have any problems with the course?
- How do you think these problems were connected to your dyslexia?
- What changes would you make to the course?

Following initial analysis of the observation and initial interview data, I conducted one follow-up interview with participants. The follow-up interview was conducted in person, with two exceptions. Two participants were unable to meet in person due to scheduling conflicts. I conducted one follow up interview via Skype and the other via email. Fortunately, the participant who completed the interview via email did not have dyslexia, which could have significantly



impacted the participant's responses to the interview questions. All interviews were digitally recorded.

I created interview forms for these interviews and used the forms to record participants' responses. Prior to these interviews, the participant had the opportunity to review my transcription of the previous interview for accuracy and make corrections as necessary. This step was done each time as part of the member checking of the data. After the follow-up interviews, participants again had the opportunity to review the transcripts of their interviews to make any corrections or changes. The questions in the follow-up interviews were driven by the information obtained through the online survey, observations, and initial interviews. The follow up interviews enabled me to more fully explore this emergent information.

#### Reflective Journal

In addition to recording observation and interview data, I also maintained a reflective journal through the data collection process. The journal entries consisted of notes and comments about the sessions, such as technical issues, impressions of the participants' activities during the observations, and any unusual circumstances that could have affected the session. These included but were not limited to participant arrived late, location of session changed due to room scheduling conflicts, distracting noise or other conversations, and session interruptions.

#### Methods and Procedures for Data Analysis

Data analysis was conducted first with the online survey, then expanded to include the triangulation of observational and interview data collected from the participants in the purposeful sample to complete the data analysis.

## Survey Analysis

The quantitative sections of the survey that included the introduction, online classes, online and gaming experience, and demographics were analyzed using descriptive statistics and frequency counts. The classes/schoolwork section contained open-ended questions that were combined into one file and then examined for recurrent trends and themes. Categories were developed from the ideas, trends, and major themes present in the classes/schoolwork section of the survey using grounded theory (Berg, 2004). This insured the categories were relevant, appropriate, and grounded in the data. These trends and themes were used to devise categories that were then used to code the data. Once the data was coded, they were grouped and examined again to ensure all data in each group was relevant and appropriate for the group. Data was recoded and reviewed as necessary. To make this process easier for me, I color-coded each theme. Once the data was color-coded, trends and patterns became much easier to see. See Figure 15 below for an example of this color-coding process.

## Observational and Interview Analysis

After the interviews were completed, they were transcribed and then emailed to participants for their review as part of the member checking process. This ensured that the interview transcripts were accurate and complete. Using the initial categories created in the survey data, additional categories were developed from the ideas, trends, and major themes present in the interview using grounded theory (Berg, 2004). This insured the categories continued to be relevant, appropriate, and grounded in the data. The grounded theory approach allowed more flexibility in the data analysis than a more purely deductive approach.

reading difficulties	Reading and retaining the information Poor writing skills, spelling, sentence structure etc
difficulty understanding lecture	i sometimes mix up words when speaking, kind of like i talk backwards. My mind drifts off when reading
in class distractions	comprehending the lectures if it is not following the book
time management	When in class, I have a lot of trouble taking in what the teacher is saying and then understanding it later. I do most of my learning out of class. The only reason that I go to class is for the attendance points. Writing essays without mistakes, getting all notes from verbal presentation ( I get about 85-93% usually), and prioritizing what's important out of a book
lack of engagement	I get distracted when others in classroom are talking while teacher is lecturing or if I hear any noise outside the classroom even with the doors closed. Some teachers, I feel, spend to much of the class time turning the lecture into - interactive class feedback. It is very distracting and annoying to hear some students drone on incorrectly or about of topic stuff that has no relevance to the class. I just want to get what I need to know and get on with my life. I'm ADD as it is, I don't need any help distracting my focus. I do like some class interaction, but I there to learn what the teacher knows.
	Getting to classes on time because I commute. I am also an older student and a single mother with family responsibilities so online is much better for me.
	my time Management is very poor and that contributes to me not completeing assignments by their due dates and keeping with the course reading
	I have trouble focusing on my work.
	When the material is extremely simple that I grasp it at the beginning of the explanation, I tend to tune out the lecturer for an extended period of time, occasionally with the result that I miss a later comment that can be important.

Figure 15. Example of color-coded themes.

Additionally, an inductive approach such as grounded theory was more appropriate for this study due to the novelty of the subject matter and the lack of accepted theoretical perspectives and pre-

existing categorical schemes (Berg, 2004). After the first interview data was analyzed, I reviewed recordings of the observation sessions for additional new categories. No new categories emerged during review and coding of the observational data.

A second interview was then developed from the responses of the first interviews and subsequent data analysis. Questions on the second interview sought to collect data that would further explain the reactions and experiences the participants had in the course design in Second Life. Additionally, I looked for themes and trends in the data in order to validate or refine the categories already developed from the analysis. The follow-up interviews were also transcribed and checked against the recordings for accuracy and completeness. Data from the second interview was examined for any new emergent categories.

New codes emerged throughout the data review and coding process. As new categories emerged, data was reviewed and recoded as necessary. Once the categories were further refined, I applied them to the data using open coding (Berg, 2004). According to Strauss (1987; as cited in Berg, 2004), there are four basic guidelines to open coding: “(1) ask the data a specific and consistent set of questions, (2) analyze the data minutely, (3) frequently interrupt the coding to write a theoretical note, and (4) never assume the analytic relevance of any traditional variable such as age, sex, social class, and so on until the data show it to be relevant” (p. 30). Additional categories emerged through the coding process. I reviewed data that had already been coded and recoded data as appropriate with the new categories. I examined each group to make sure all of the data included in the group was relevant and appropriate for that group. Data was recoded as necessary and the groups were reviewed again.

After the data was coded and categorized, it was sorted by theme. I counted all themes present in each data set for the sampled participants that included online survey, observation

recording, initial follow-up interview, and second follow-up interview. These counts were used for descriptive statistics and to show which themes were most prevalent. I also looked for unusual or unique themes present in the data (Berelson, 1952; Berg, 1983; Merton, 1968; Cook et al., 1959, as cited in Berg, 2004). I reviewed the sorted data, looking for patterns in the data. The patterns were examined relative to previous research and available literature. Finally, I analyzed and explained the patterns in relation to previous research and literature.

	First	Second	Third	Fourth
Rachel	course areas/central tree	course materials	engaging environment	videos
Billy	course materials	engaging environment	technical problems	discussions
Deborah	engaging environment/explore environment	participant left course area	interaction	course materials
Jack	intro video	course materials	course areas/social area	engaging environment
Irene	sl mechanics	technical problems	intro video	engaging environment
Liz	course area/group meeting	course materials	videos	technical problems
Cheryl	course materials	course areas	engaging environment	central tree
Nathan	course materials	engaging environment	intro video	course areas

Figure 16. Example of color coding of themes.

After all data were coded and reviewed, I looked at themes that were most prevalent in each data set. Themes were broken down first by data set and then by participant for both interviews and the observation sessions. In order to make trends across all participants more evident, I copied the top four most prevalent themes from each user into a spreadsheet and then color-coded like themes. See Figure 16 below for an example of this process. This process was repeated for each interview and the observation sessions separately. Once initial data analysis for

each data set was completed, I looked at all three data sets together to look for patterns or unique themes. Additionally, I reviewed all three data sets for each participant to look for any patterns or unique themes.

### Validity

Validity must be established for the reader to determine the findings' credibility or authenticity. Validity procedures in mixed methods research should address all phases of the study (Creswell, 2003). This study uses triangulation, in both data collection and analysis, as a means for establishing overall research validity. According to Creswell, Clark et al. (2003), triangulation is the most common and well-known approach to mixed methods research design. It is typically used when the researcher wants to compare/contrast quantitative and qualitative results or validates or expands quantitative results with qualitative data (Creswell, Clark, et al., 2003).

This study used survey data, observation data, and data collected from semi-structured interviews. Employing all three methods negates biases associated with one method by way of biases associated with another method (Berg, 1983). In the data analysis, the use of three distinct approaches to address the data allows for the desirable triangulation of efforts. The results of this study are not intended to be generalizable beyond the population of the study. Instead, the results are intended transfer the research into a context shared by the reader.

### Rigor and Trustworthiness

One of the biggest challenges in conducting mixed methods research is establishing the trustworthiness and rigor of the qualitative data gathered (Creswell & Clark, 2007). According to

Sandelowski (2000), “trustworthiness becomes a matter of persuasion whereby the scientist is viewed as having made those practices visible and, therefore, auditable ”(p. 2). Consequently, the reader determines if the study is trustworthy based on the evidence and audit trail presented by the researcher (Rolfe, 2004). Trustworthiness consists of credibility, dependability, transferability, and confirmability (Graneheim & Lundman, 2004; Guba & Lincoln,1985). According to Davies and Dodd (2002), rigor in qualitative research refers to self-discipline and vigilance about research methods. Rigorous studies are accountable even using more flexible qualitative research methodologies. A rigorous and trustworthy qualitative study is conducted fairly and ethically and represents as closely as possible the experiences of the study participants (Steinmetz, 1991).

The most common threats to trustworthiness and rigor in qualitative research can be classified in the following three categories: reactivity, researcher biases, and responder biases. Reactivity can occur because the researcher’s presence distorts the behaviors and beliefs of the respondents. Researcher biases can occur when the researcher’s interpretations and observations are influenced by the researcher’s preconceived notions and personal opinions. Consequently, the researcher may choose respondents they feel agree with their opinions and notions, ask leading questions to attempt to influence the answers of the respondents, or ignore data that does not support their desired conclusions. Respondent biases can occur when respondents either withhold information or give misleading responses. This can happen when respondents do not want to reveal information (for example, drug and alcohol use) or want to help the researcher by making their responses fit what they think the researcher wants to find (Padgett, 2008). Padgett (2008) recommends using triangulation, peer debriefing/ support, member checking, negative

case analysis, and an audit trail as strategies for enhancing rigor and trustworthiness in qualitative research.

Padgett's strategies attempt to ameliorate the risks to trustworthiness and rigor discussed above. However, not all strategies are appropriate for all qualitative research methods (Padgett, 2008). I used the following five strategies to demonstrate the rigor and trustworthiness of this research: triangulation, member checking, negative case analysis, audit trail, and a reflective journal. I used interviews, observations, and a survey to triangulate my data. Asking each participant to review transcripts of their responses from prior interviews and observations and make any corrections or comments supported member checking. Negative case analysis was supported by including participants with a variety of experience with online classes, gaming, and Second Life, of varying ages and majors. An audit trail, as recommended by Lincoln and Guba (1985), documented each step I took in data collection and analysis. In addition to raw data, I also included notes and memos about how I developed my coding strategy, applied it to my data, and then analyzed my data. I also included a reflective journal including my schedule of observations and interviews and notes and personal reflections about individual sessions.

### Summary

This chapter detailed the methodology used in this study. It included the methods to be used for data collection and data analysis of the online survey, observations, and interviews. Finally, the procedures for establishing validity of the data and resulting conclusions were outlined. In the following chapters, the results of the study are presented. Noteworthy trends and recurring themes are also discussed.



## CHAPTER 4

### RESULTS

This chapter, which is divided into two sections, presents the results of the data analysis of the study. The first section presents data analysis on the survey taken by all participants. It also presents demographics information for all 92 participants involved. See Appendix C for the survey and Chapter 3 Data Collection Survey Section (p. 81) for details. The survey collected data on the academic difficulties participants experience in their face-to-face classes and their online classes, participants' online activities, participants' experience with video games, and any accommodations they receive for learning disabilities. The second section presents data concerning the purposeful sample of eight students that completed all phases of the study that included the survey, course interaction observation, and interview elements. It is divided into two subsections that presents the demographic and survey data analysis and then the qualitative data collected from the two interview phases of the study and observations. See Appendix E for details on the interview questions and Chapter 3 Interview Section for details regarding the interview process.

#### Results (All Participants)

Ninety-two participants completed the online survey. Of the participants who completed the online survey, 12% were identified as having dyslexia. Ages ranged from 19 to 57 with the majority of the population in the age range 19-25, as shown in Figure 17.

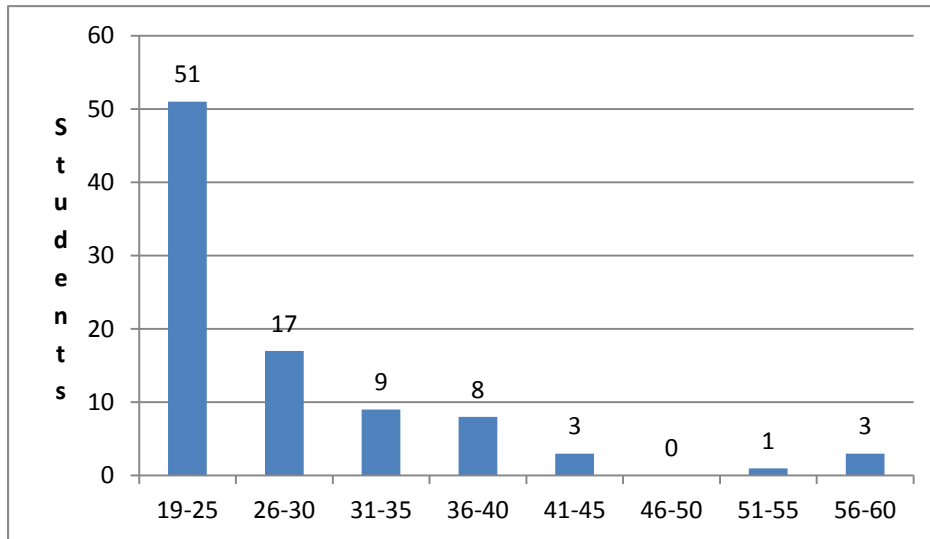


Figure 17. Age range of population.

Gender analysis showed 65% were female, 28% were male, 2% reported their gender as Other, with 5% declining to report their gender. Figure 18 shows the results of the ethnicity question with 60% White, 22% Black, 11% Hispanic, 10% Other, 5% Asian/Indian, 1% Native American, and 18% declined to answer. Seventy-one percent of the population reported they were not Hispanic.

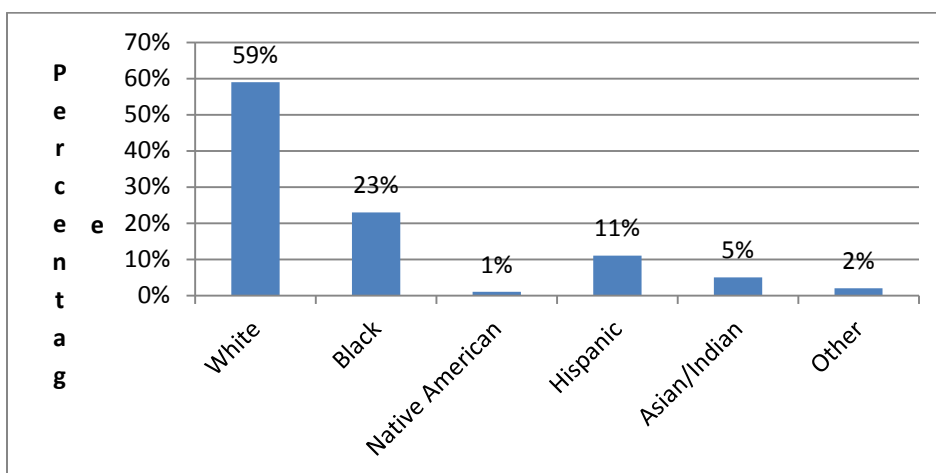
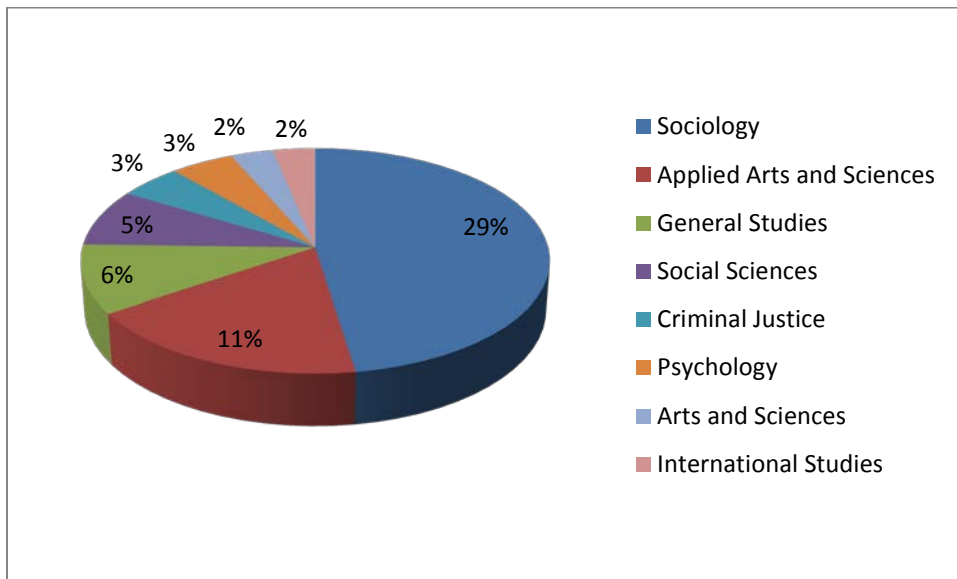


Figure 18. Ethnicity of study population.

When asked to report their year in school, 88% reported undergraduate, 4% graduate, 4% other, and 7% declined to answer. The undergraduates reported 1% Freshmen, 2% Sophmores, 19% Juniors, 19% Juniors, and 62% Seniors. A wide range of majors were represented in the population as well, as shown in Figure 19. The largest group of participants was Sociology majors (29%), followed by Applied Arts and Sciences (11%), General Studies (6%), Social Sciences (5%), Criminal Justice (3%), Psychology (3%), Arts and Sciences (2%), and International Studies (2%). Eight percent of the population declined to provide their majors. Additionally, one participant each represented the following majors: Pharmacy Practice, Mechanical Engineering Technology, Biology, and Business Computing Information Sciences. As discussed in Chapter 3, a large enrollment course in the Sociology department was part of the recruitment process and might account for the larger group of participants.



*Figure 19.* Majors represented in the study population.

### Difficulties Experienced with Face to Face Classes

Participants were asked to select any difficulties they experience when studying for or

attending face-to-face classes. They were also given an option to provide any difficulties that were not listed on the survey. Tables 5 and 6 shows the breakdown of the questions and number of responses. Time management was the most common difficulty reported, with 19% of the population reporting they experience this difficulty. Keeping up with course readings and assignments was the second most commonly reported difficulty (17%). Reading or understanding text and writing papers or other assignments were reported by 13% of the population each. Ten percent of the population reported having difficulty with organization and listening or understanding verbal lectures or instructions. Seven percent reported having problems completing assignments by their due dates, and 9% of the participants reported that they had no difficulties when attending or studying for their face to face classes.

Table 5

*Difficulties Population Experienced in Face-to-Face Classes*

Face to Face Difficulties	Percentage
Time management	19%
Keeping up with assignments	17%
Reading or Understanding Text	13%
Difficulty with organization or understanding lectures	10%
Completing Assignments by due dates	7%
No difficulties at all	9%
Other	20%

Twenty percent of the population also selected the Other option and provided other difficulties they experience, resulting in 19 responses. The responses were analyzed for emergent trends and themes using a grounded theory approach to ensure the themes were relevant, appropriate, and grounded in the data. See Chapter 3 Data Analysis Section for more detail.

Table 2 shows the themes present in the responses. The following themes emerged from their responses: Reading difficulties, Difficulty understanding lecture, In-class distractions, Time management, and Lack of engagement. Reading difficulties was the top theme with 33% reporting difficulties in this category. Lack of engagement was the second most prevalent theme (22%). Difficulty understanding lecture and Time management were each reported by 17% of the population and 11% of the population reported having difficulties with In class distractions.

Table 6

*Other Face-to-Face Difficulties*

Other Face to Face Difficulties	Percentage
Reading difficulties	33%
Lack of engagement	22%
Difficulties understanding lecture	17%
Time management	17%
In class distractions	11%

Difficulties with Online Classes

Participants were asked if they experienced different difficulties with online classes than they did with face to face classes. Fifty-seven percent reported they had no different difficulties with online classes than they did with face to face classes. However, 40% reported that they did experience different difficulties in online classes. These respondents were asked to describe their difficulties with online classes, resulting in 38 responses. As with the responses above, these responses were analyzed for emergent trends and themes using a grounded theory approach. See Chapter 3 Data Analysis Section for more detail. Table 7 below shows the themes present in the responses. The following themes emerged from their responses: Difficulty understanding material, Difficulty managing own learning, Lack of teacher/student interaction, Time

management, Too rushed on tests and assignments, Communication difficulties, Lack of engagement. The most prevalent theme was Difficulty understanding material with 32% of the population reporting difficulties in this category. Difficulty managing own learning was the second most prevalent theme (24%), followed by Lack of teacher/student interaction (13%), Time management (11%), Too rushed on assignments and tests (11%), Communication difficulties (3%), and Lack of engagement (3%).

Table 7

*Difficulties with Online Classes*

Difficulties with Online Classes	Percentage
Difficulty understanding material	32%
Difficulty managing own learning	24%
Lack of teacher/student interaction	13%
Time management	11%
Too rushed on assignments and tests	11%
More relaxed than f2f classes	3%
Flexibility	3%
Communication difficulties	3%
Lack of engagement	3%

Disabilities

The survey asked participants if they were registered for any accommodations with the university’s Office of Disability Accommodations (ODA). The majority of the participants (88%) responded that they were not registered with the ODA. However, eleven participants (12%) reported that they were registered with the ODA as shown in Table 8. Participants were also asked if they considered themselves dyslexic of which 89% of the population responded that they did not consider themselves dyslexic. Ten participants (11%) did consider themselves

dyslexic as shown in Table 9. These participants were then asked how long they had known they were dyslexic. Nine participants reported they had known for more than five years. One participant had known for one to three years.

Table 8

*Percentage of Population with a Disability*

Disabilities	Percentage
No Disability	88%
People with a Disability	12%

Table 9

*Percentage of Population with Dyslexia*

Dyslexia	Percentage
Those with a disability that do not have dyslexia	89%
Those with a disability that do have dyslexia	11%

Accommodations

The ten participants who reported they were dyslexic were asked to select the accommodations they were receiving from a list. Figure 20 shows the specific accommodations reported by participants. They were also given the opportunity to enter any accommodations that were not on the list. Extended time on tests (35%) and alternative test environment (35%) were the top two accommodations reported by the participants. Fifteen percent reported receiving extended time on assignments. Eight percent reported receiving modified tests/assessments. One participant (4%) reported receiving modified assignments, and one participant (4%) reported receiving no accommodations. Three participants also reported other accommodations. One

participant reported receiving alternate classes. One reported being allowed to use software that reads text out loud. One participant reported he or she uses a computer for notes, has access to a note taker, and has access to audio formats of text books.

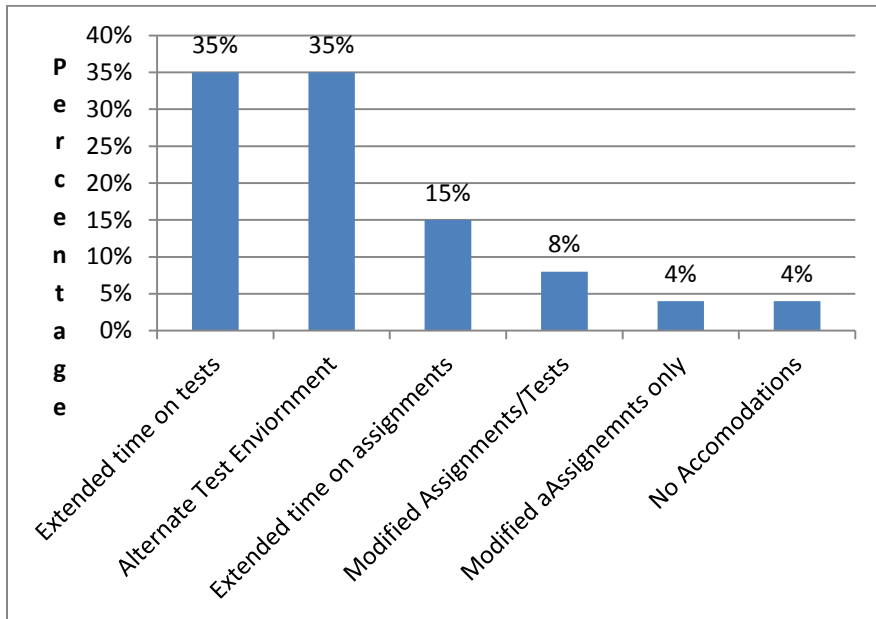


Figure 20. Dyslexia accommodations reported by participants.

### Online Activities

All participants were asked to estimate how much time they spent on various online activities each week. They were also asked if they owned a computer at home and if they had grown up with a computer at home. Ninety-seven percent reported they did own a computer and 65% reported they had a computer at home growing up.

Participants were asked to estimate how many hours a week they spent on non class, non work related online activities. Figure 21 shows the number of hours spent per week which shows Seventy-two percent of the participants reported 1-10 hours weekly, 21% 11-20 hours, 4% 21-30 hours, 1% 31-40 hours, and 2% spending more than 40 hours weekly on non-class, non-work related online activities.



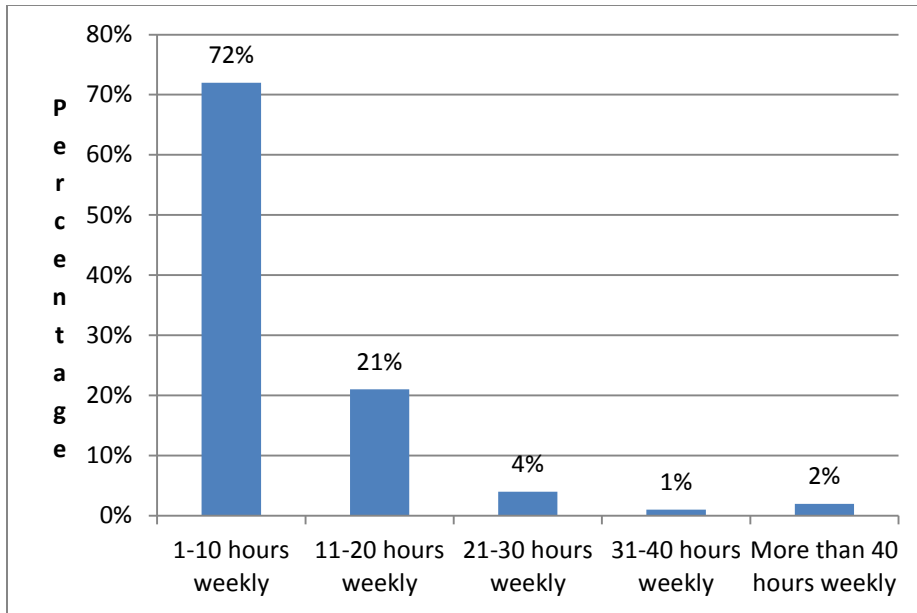


Figure 21. Number of hours spent weekly on non work, non school online activities.

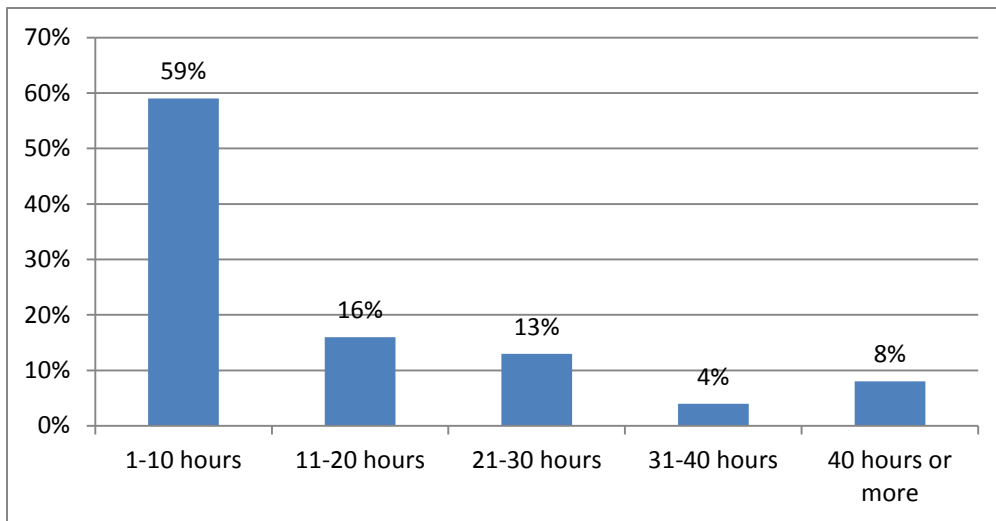
Participants were asked to select their online activities from a list or list any activities not listed. Table 10 below reports their online activities that shows 85% reported surfing the web, 80% using social networking like Facebook or Twitter, 22% playing games, 38% watching videos, 41% watching TV shows or movies, 4% banking or paying bills, 2% online shopping, and 1% reported each reading news, chatting, checking email, and researching.

Table 10

*Non-Work, Non-School Online Activities*

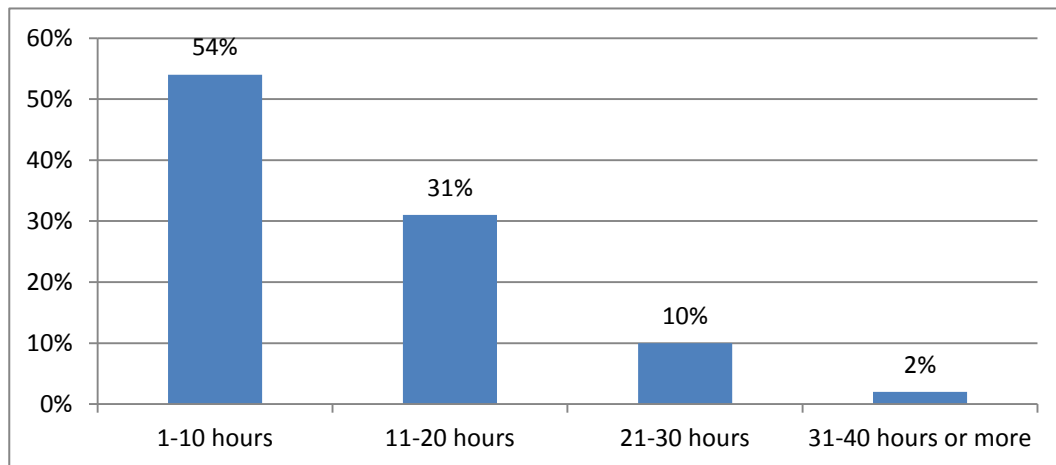
Non Work, Non School Online Activities	Percentage
Surfing the web	85%
Social networking (Facebook, Twitter)	80%
Playing games	22%
Watching videos	38%
TV shows or movies	41%
Banking or paying bills	4%
Shopping	2%
Reading news, chatting, etc.	1%

The survey asked participants to estimate how many hours per week they spent online on work or work related activities. The majority of participants (59%) reported they spent 1-10 hours weekly. Figure 22 shows that 16% of participants reported spending 11-20 hours, 13% spent 21-30 hours, 4% spent 31-40 hours, and 8% spent 40 hours or more online for work or work related activities.



*Figure 22.* Hours spent weekly online for work.

Participants also reported the number of hours they estimated they spent weekly on classes and school work. The majority of participants (54%) reported spending 1-10 hours weekly. Figure 23 shows that 31% reported spending 11-20 hours weekly, 10% spent 21-30 hours, and 2% each spent 31-40 hours and 40 hours or more.



*Figure 23.* Hours spent weekly on classes/school work.

### Online Classes

All participants were asked about their experience with hybrid classes, web enhanced classes, and online classes. Hybrid classes were defined as classes that present the majority of the class online with some face-to-face classes. Web enhanced classes were defined as face-to-face classes that present some course activities or materials online. Online classes were defined as classes that met solely online with no face-to-face meetings. First, participants were asked if they had ever taken any kind of online class, which reported 98% responded that they had, and 2% responded they had not. Of those taking online classes, 11% reported they had taken 1-2 online classes, 36% reported they had taken 3-5 online classes, 34% reported they had taken 6-10 classes, and 16% reported they had taken more than 10 online classes.

Next, the participants were asked how many of each type of class they had taken. Table 11 below reports the specific details of their responses. When asked how many fully online classes they had taken, 23% of the participants reported they had taken 1-2 classes, 31% reported they had taken 3-5 classes, 33% reported they had taken 6-10 classes and 11% reported they had taken more than 10 classes online. When asked how many hybrid classes participants had taken,

54% reported they had taken 1-2 classes, 4% reported they had taken 3-5 classes, and no participants reported they had taken 6 or more hybrid classes. Finally, participants were asked how many web enhanced classes they had taken with 26% reporting they had taken no web enhanced classes, 40% reported they had taken 1-2 classes, 14% reported they had taken 3-5 classes, 9% reported they had taken 6-10 classes, and 11% reported they had taken more than 10 web enhanced classes.

Table 11

*Participants Experience with Online Classes*

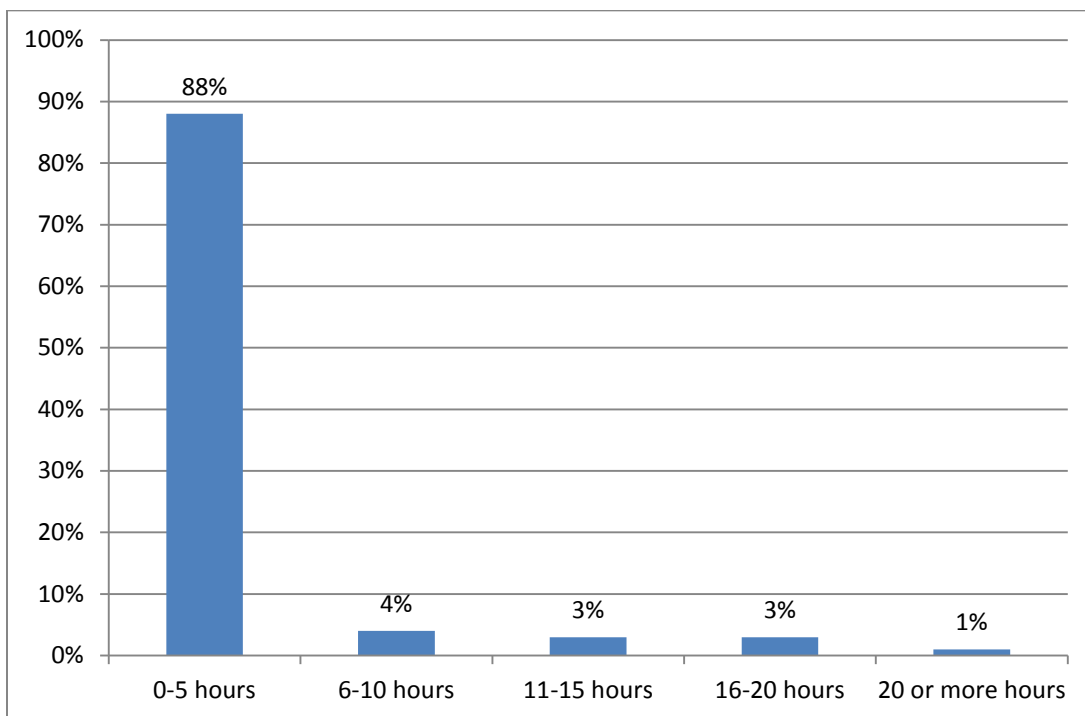
Class Type-Fully Online	Percentage
1-2 classes	23%
3-5 classes	31%
6-10 classes	33%
10 or more classes	11%
Class Type-Hybrid	Percentage
1-2 classes	54%
3-5 classes	4%
6 or more classes	0%
Class Type-Web Enhanced	Percentage
1-2 classes	40%
3-5 classes	14%
6-10 classes	9%
10 or more classes	11%
No classes	26%

The survey asked participants to select all of the systems on which they had taken online classes or supply the name of the system or systems if they were not on the list. The top three systems were Blackboard with 97%, WebCT with 58%, and eCampus with 57% of participants reporting they had taken classes on it. Other systems included 12% Angel Learning, 1% Desire2Learn, and 21% reported they had taken classes on a course website or their professor's website. One percent reported they did not know what system or system hosted the classes they

had taken. Less than one percent listed Moodle, TCC Online, Course Compass, Smart, MyMath Lab, and an unknown college online math homework site.

### Video Games

Participants were asked to report the number of hours they spend playing video games weekly. They were also asked to list the games they typically play. Figure 24 below reports the number of hours participants report playing video games weekly that shows 88% playing games 0-5 hours per week, 4% playing 6-10 hours, 3% playing 11-15 hours, 3% playing 16-20 hours and 1% playing more than 20 hours per week. A little less than half (43%) of the population reported they did not play video games.



*Figure 24.* Number of hours participants play video games weekly.

In addition to estimating the number of hours they spend playing video games weekly, participants were also asked to list the games they typically play. Only 68% of the participants chose to answer the question. Of the participants who reported they did play games, many of

them listed multiple games, often in different categories. Consequently, their responses are counted in multiple categories below. The games listed by these participants fell into a very wide range of categories. Please see Appendix G for the full listing of categories and responses. Figure 25 reports the top four categories of games reported by participants, first person shooters, massively multiplayer online, real time strategy, and role playing. Twenty-eight percent of the responses fell into the Do not play games category. This was the most prevalent category.

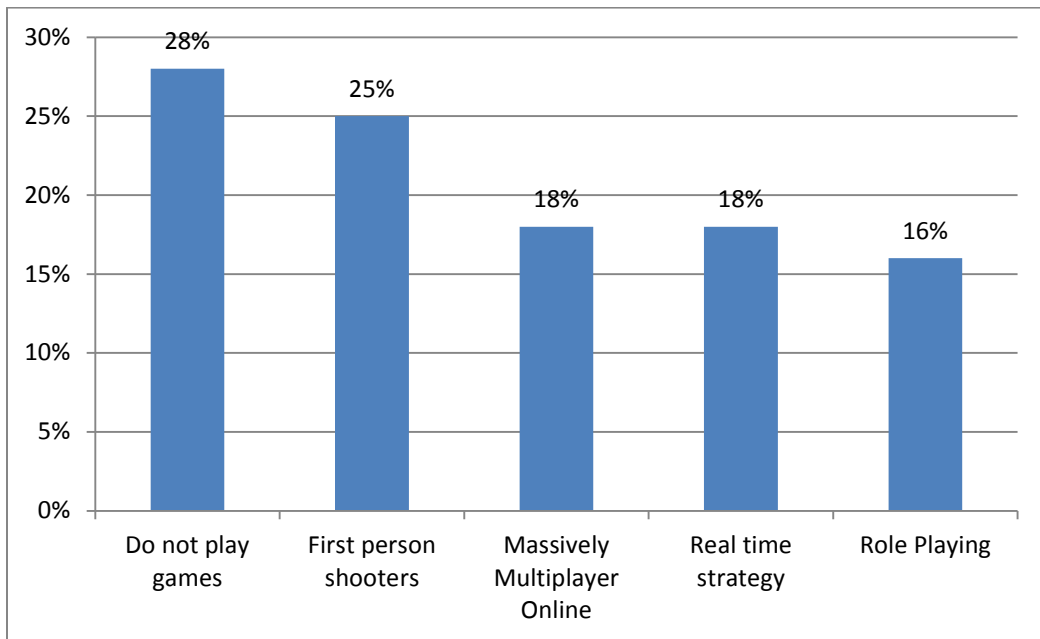


Figure 25. Top five categories of video games reported by participants.

## Second Life

Participants were asked if they had ever heard of Second Life and what experience they had with the virtual environment of which 87% reported they had not heard of Second Life. Another 7% reported they had logged in to Second Life once or twice. No participants reported they had logged in many times, had multiple toons or avatars in Second Life, had built buildings or other objects, had taken a class in Second Life, had created scripts or scripted objects, had

explored the grid or they considered themselves very experienced in Second Life. Six participants reported other experience with Second Life. Two reported hearing about it in their classes. One reported looking at the website. One participant knew of Second Life and “the concept of it.”

### Results (Purposeful Sample)

The data presented in this section was collected from the eight participants who completed the entire research project that included the survey, both interview phases, and the observation phase. See Chapter 3 Sampling Procedure Section for further details on the selection process. This section will provide the results for the eight participants regarding the survey data and then for the observational and interviews.

The eight participants of the purposeful sample included five females and three males. Three of the participants identified as dyslexic, and five stated they had no learning disabilities. Of the three participants who identified as dyslexic, two were female and one was male. Of the five participants without learning disabilities, three were female and two were male. Their ages ranged from 19 to 35. Three were seniors, three were juniors, and two were graduate students. there were two sociology majors, one human development major, one pre-pharmacy major, one general studies major, one business computer information science major, and one mechanical engineering technology major. the three participants with dyslexia were one male mechanical engineering technology junior, one female human development junior, and one female general studies senior. One female identified as Black, one female identified as Hispanic, three females identified as White, and three males identified as White. Of the three participants with dyslexic, one was a female identified as Black, one was a female identified as White, and one was a male

identified as White.

Each of the eight participants is described below. Pseudonyms were assigned during the data collection and are used to protect the privacy of the participants. Table 12 shows a breakdown of the participants.

Table 12

*Overview of Purposeful Sample Participants*

Name	Learning Disability	Gender	Age	Race	Major	Video Games (Hrs played, weekly)	Prior Second Life Experience
Deborah	Yes	F	23	Black	General Studies	0-5 hrs	No
Cheryl	No	F	25	White	Sociology	0-5 hrs	Yes
Billy	Yes	M	25	White	Mechanical Engineering Technology	20+ hrs	Yes
Nathan	No	M	19	White	Sociology	0-5 hrs	No
Irene	No	F	21	Hispanic	Spanish	0-5 hrs	No
Jack	No	M	26	White	Business Computing Information Systems	16-20 hrs	No
Rachel	No	F	35	White	Pre-Pharmacy	0-5 hrs	No
Liz	Yes	F	29	White	Human Development	0-5 hrs	No

Deborah

Deborah is a 23 year old Black female general studies senior. She identified as having several learning disabilities including dyslexia. She moved to the state her junior year in high school and completed high school. Her education experience was unique among the participants as she is a military dependent and attended school in multiple countries as well as three different states in the United States. She was unaware of her learning disabilities until she began attending



the university. Deborah reported that she has completed a limited number of online classes and hybrid classes. She had no knowledge of Second Life prior to the study. She does play a limited number of video games but not during the semester.

### Cheryl

Cheryl is a 25 year old White female sociology junior. She did not identify as having any learning disabilities. Her education was completed entirely in the state, though she did attend private school in a rural area for part of grade school. She had some knowledge and familiarity with Second Life prior to the study as she had assisted with the development of an island and tutored others in the mechanics of navigation and interaction in Second Life. Cheryl had extensive experience taking online classes, web enhanced classes, and hybrid classes. She had very limited experience with video games and did not actively play them at the time of the study.

### Billy

Billy is a 25 year old White male mechanical engineering technology junior who identified with numerous learning disabilities including dyslexia. He attended high school in the state at a private school before attending a small college for students with learning disabilities. When he completed his studies there, he transferred to another institution with programs designed for students with learning disabilities. He completed another two years at that institution before transferring to the university. Billy's education history is unusual as he received extensive training and assistance in the attempt to remediate his learning disabilities. His accommodations began in elementary school. He had limited knowledge of Second Life prior to the study. However, he was a prolific gamer who played numerous and varied online

games in virtual environments. He had taken not online classes or hybrid classes thought he had moderate experience with web enhanced classes.

Nathan

Nathan is a 19 year old White male sociology senior. He did not identify as having any learning disabilities. He had no knowledge of Second Life prior to the study. Additionally, he did not play video games of any kind, and he had no experience with online games or virtual environments. Nathan had extensive experience with online classes, web enhanced classes, and hybrid classes. He completed his education entirely in the state and planned to go on to pursue a graduate degree in theology immediately upon graduation.

Irene

Irene was a 21 year old Hispanic female Spanish senior. She did not identify as having any learning disabilities. Her experience with online classes and hybrid classes was limited. She did not have any experience with web enhanced classes. Prior to the study, she had limited knowledge of Second Life. She had observed her husband as he explored Second Life, but she had never been inside Second Life herself until the study. Additionally, she had no experience with online games or virtual environments and limited experience with video games as a whole. She completed her education in the state prior to beginning her undergraduate degree at the university.

Jack

Jack is a 26 year old White male business computer information systems graduate

student. He did not identify as having any learning disabilities. Jack had limited experience with online classes and web enhanced classes. He had no experience with hybrid classes. Prior to the study, he had heard of Second Life but he had no experience with it. He had extensive gaming experience in a variety of games including online games in virtual environments. Jack completed most of his grade school education in the state and graduated from high school in the state, but he did attend school for a short period between grade school and graduating from high school. He completed his bachelor degree at the university prior to beginning his graduate studies.

#### Rachel

Rachel is a 35 year old White female pre-pharmacy graduate student. She did not identify as having any learning disabilities. After completing an undergraduate degree at a previous university and working for several years, she decided to go to pharmacy school. She completed her pre-pharmacy work at the university just prior to the study. Rachel completed high school out of state before moving in state to pursue her undergraduate degree. She had extensive knowledge of online learning. However, much of her experience was with professional continuing education rather than college credit classes. She had limited knowledge and experience with Second Life prior to the study. Additionally, she had fairly extensive experience playing video games including online games in virtual environments.

#### Liz

Liz is a 29 year old White female human development junior. She identified as having dyslexia. Her learning disability was not diagnosed until she started community college after high school. She had other illnesses that caused developmental challenges when she was a child.

Consequently, she had accommodations starting in elementary school. Liz had extensive experience with online classes and web enhanced classes and limited experience with hybrid classes. She also had experience with online professional certification classes and continuing education classes. Prior to the study, she had no knowledge of Second Life. While she played video games fairly frequently, they were limited primarily to console games with no online interaction or virtual environments.

### Survey Results

The following is the results of the survey analysis for the eight sampled participants and cover the areas of disabilities, accommodations, demographics, difficulties experienced with face-to-face classes, difficulties with online classes, online activities, online classes, video games, and Second Life experience.

#### Disabilities

Participants were asked if they are registered with the university's Office of Disability Accommodations (ODA). Three participants reported they are registered with the ODA, five participants reported they are not registered with the ODA. Additionally, participants were asked if they considered themselves dyslexic. Three responded that they did, five responded that they did not consider themselves dyslexic. Of the three participants who did consider themselves dyslexic, one had known for 1-3 years and the other two had known for more than 5 years.

#### Accommodations

The three participants who reported they were registered with the ODA reported receiving the following accommodations. All three received extended time on tests and

alternative test environments. Two reported they are allowed to take modified tests or assessments. One reported being allowed to submit modified assignments. Additionally, one participant reported being allowed to use a laptop to take notes in class, the use of a note taker or scribe, and access to audio formats of text books. No other accommodations were reported. The same three participants were asked when they began receiving accommodations. Two received them prior to coming to college, one in the sixth to eighth grades and one in the ninth to tenth grades. The third participant did not receive accommodations prior to starting college.

### Demographics

The eight sample participants consisted of five females and three males. Tables 13 and 14 overview their ethnicity and age. Their ages ranged from 19 to 35 years of age with a mean and a mode of 25 years of age. Two participants were Juniors, two were Seniors, and one was a Graduate student. Two participants reported their year in school as Other with one report of “Junior with 170+ hours” and one report of “second round of undergrad.” The sub population consisted of one African American female, two White females, one Hispanic female, and three White males.

Table 13

#### *Ethnicity of Sub Population*

Ethnicity of sub population	<i>n</i>
African American Female	1
White Females	2
Hispanic Female	1
White Males	3

Table 14

*Ages of Sub Population*

Age	<i>n</i>
19	1
23	1
21	1
25	2
26	1
29	1
35	1

Difficulties Experienced with Face to Face Classes

Participants, including both those with and without dyslexia, were asked to select difficulties they experience in their face to face classes. Table 15 below reports the categories of difficulties participants experienced in their face-to-face classes. Four participants reported having difficulty reading or understanding text, three reported having difficulty writing papers or other assignments, four reported having difficulty keeping up with course readings and/or assignments, four reported difficulty with organization, five reported difficulty with time management, three reported they had difficulty listening or understanding verbal lectures or instructions, two reported having difficulty completing assignments by their due dates, and one participant reported having none of these difficulties. Additionally, participants were given the option of describing any other difficulties they experience in their face-to-face classes. Three participants elected to provide additional information about their difficulties in face to face classes. One participant described difficulties with turning or reversing letters and shapes leading to difficulties with words, geometry, and maps because “I tend to get things backwards or mixed

up.” One participant described difficulties staying engaged with a lecture if the material is perceived to be simple. The same participant also described difficulties with time management and procrastination. The third participant described difficulties with understanding written information in subjects like chemistry and physics, requiring multiple readings before the material “actually starts to sink in.”

Table 15

*Difficulties Experienced in Face-to-Face Classes*

Difficulties Experienced in Face-to-Face Classes	<i>n</i>
Reading or understanding text	4
Writing papers or other assignments	3
Keeping up with course readings/assignment	4
Difficulty with organization	4
Time management	5
Difficulty listening or understanding lectures/instructions	3
Difficulty completing assignments by their due date	2
No difficulty	1
Other	3

Difficulties with Online Classes

Participants were asked if they experienced different difficulties in online classes. Tables 16 and 17 below report the number of students who experienced different difficulties in online classes and the types of difficulties they experienced. Six participants reported they did experience different difficulties in their online classes. One participant reported no differences in the difficulties they experience in online classes, and one participant had never taken an online class. Of the six participants who reported experiencing different difficulties in their online classes, three reported problems with the amount of reading required in most online classes. One

participant reported having difficulty managing his or her own learning if the course is not structured enough. One participant reported difficulty communicating with the professor, especially in trying to get assistance with the course. The participant who reported difficulty paying attention to lecturers in class noted that he does not experience that difficulty in online classes as there are generally no lecturers in online classes.

Table 16

*Participants Who Experienced Different Difficulties in Online Classes than Face-to-Face Classes*

Differences in Difficulties in Online Classes	<i>n</i>
Experience Different Difficulties	6 (75%)
No Differences	1 (12%)
Never took an online class	1 (12%)

Table 17

*Difficulties Participants Experienced in Online Classes*

Difficulties Experienced in Online Classes	<i>n</i>
Reading difficulties	3
Difficulty managing own learning	1
Communication difficulties	1

Online Activities

The survey asked a series of questions about the sample participants' online activities. Additionally, they were asked if they owned a computer and if they had a computer at home while they were growing up. All eight participants reported they own a computer, and all but one participant had one at home while they were growing up.



When asked to report how many hours they spent online for work each week, three participants reported spending 1-10 hours each week, two reported spending 11-20 hours each week, two reported spending 21-30 hours each week, and one reported spending 31-40 hours each week, as illustrated by Figure 26.

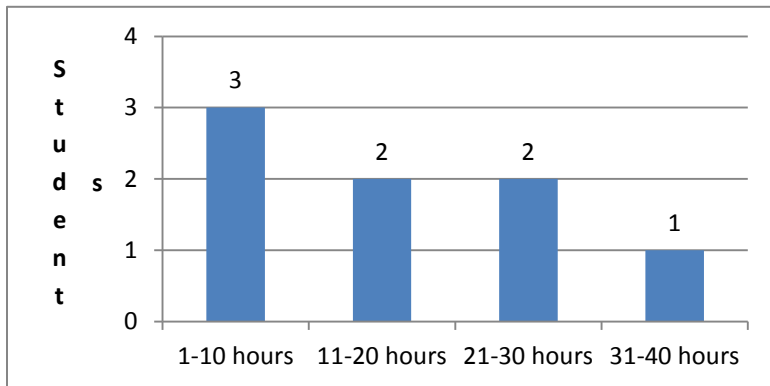


Figure 26. Hours spent weekly online for work.

Participants in the sample were also asked to report how many hours they spent online for class each week. One participant reported spending more than 40 hours online for classes each week, three reported spending 1-10 hours weekly, one reported spending 11-20 hours weekly, two reported spending 21-30 hours weekly, and one reported spending 31-40 hours online for classes weekly, as illustrated by Figure 27.

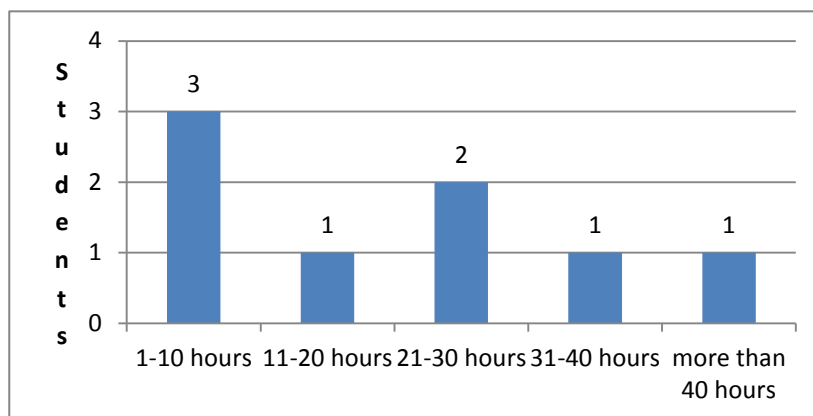


Figure 27. Hours spent weekly online for class or school work.

Finally, participants were asked how many hours they spent each week on other online activities and what those activities were. Figures 28 and 29 below report the number of hours participants reported spending on other online activities and the categories of activities they reported doing online. Four participants reported spending 11-20 hours weekly on other online activities, three spent 1-10 hours weekly, and one spent more than 40 hours weekly on other online activities. All eight participants reported they spend time each week on social networking sites such as Facebook, and all but one participant reported surfing the web weekly. Half of the participants reported playing games online each week. Additionally, half the participants reported watching videos, TV shows, or movies online each week.

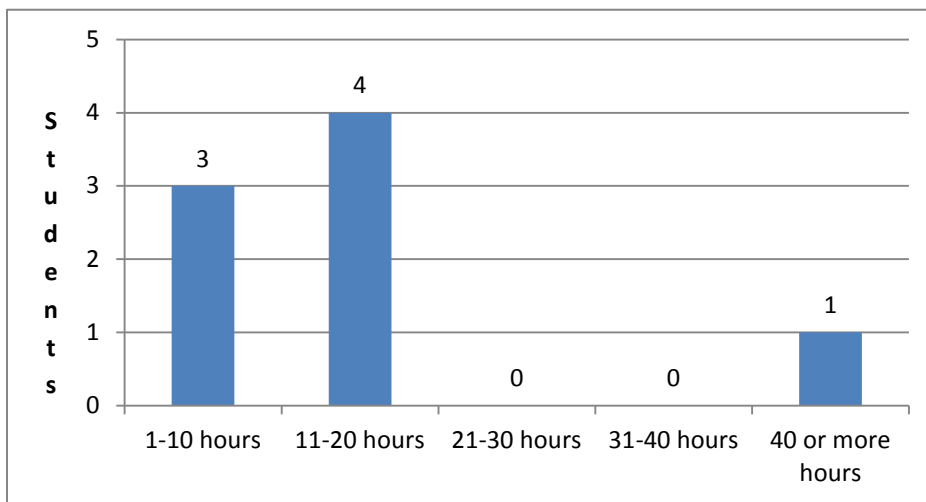


Figure 28. *Hours spent weekly on other online activities.*

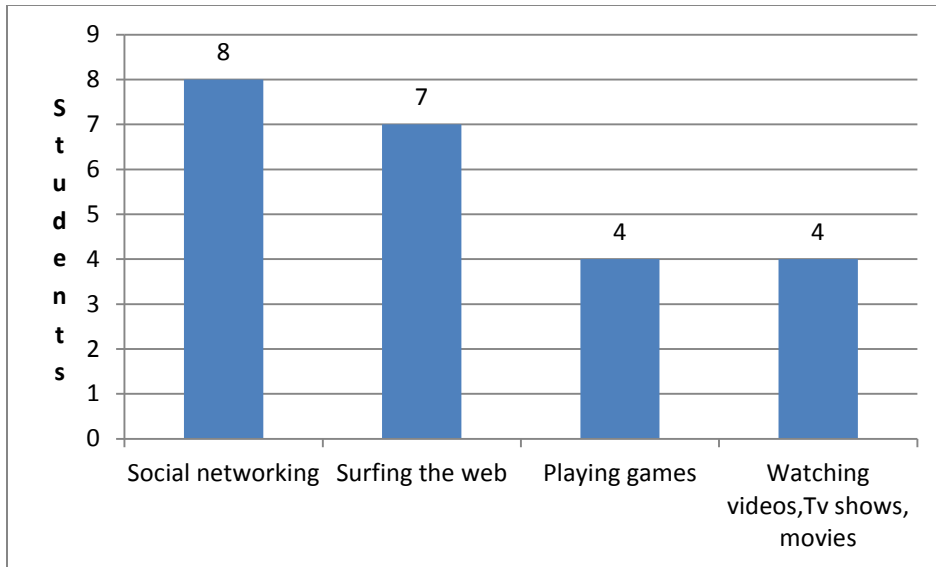


Figure 29. Other online activities reported by participants.

### Online Classes

The eight participants were asked if they had taken any online classes, including web enhanced courses, hybrid courses, and entirely online classes. Table 18 below reports the numbers of participants who had taken each type of online course listed above. All eight participants had taken at least one class with online elements. However, one participant had never taken a completely online course. Three participants had taken 1-2 fully online classes. Two had taken 6-10 fully online classes, and one had not taken any fully online classes. Five participants had taken 1-2 hybrid classes, and three had taken no hybrid classes. Three participants had taken 1-2 web enhanced classes. One had taken 3-5 web enhanced classes. Two had taken 6-10 classes. One had taken more than 10, and one had taken no web enhanced classes.

Table 18

*Number of Students Who Have Taken Various Types of Online Classes*

Class Type	<i>n</i>
Class with online element	8
Fully online	5
Hybrid class	5
Web enhanced	7

Table 19 below reports the platforms participants had used for taking online classes. All eight participants had taken classes on Blackboard. All but one had taken classes on WebCT. Five had taken classes on eCampus. Two had used the Angel Learning System. Five had taken classes hosted on their professors' websites. Two had taken classes on Moodle, and two reported they were not sure what system they had taken classes on at other schools.

Table 19

*Platforms Used by Participants for Online Classes*

Platform Used for Online Classes	<i>n</i>
Blackboard	8
WebCT	7
Ecampus	5
Angel Learning	2
Professors' website	5
Moodle	2
Not sure what platform was used	2

## Video Games

When asked to estimate the number of hours they spend playing video games each week, six of the eight participants reported they spend 0-5 hours each week playing video games. Of

the two remaining participants, one reported playing video games 11-20 hours and one reported playing more than 20 hours each week, as illustrated by Figure 30 below. Additionally, participants were asked to list the games they usually play. Table 20 below reports the types of games participants report they play, including those who do not play at all. Two reported they do not play games at all. One person reported playing cooking games. One person plays Wii sports games and platform games. However, role playing games, strategy games, and adventure games were the most popular.

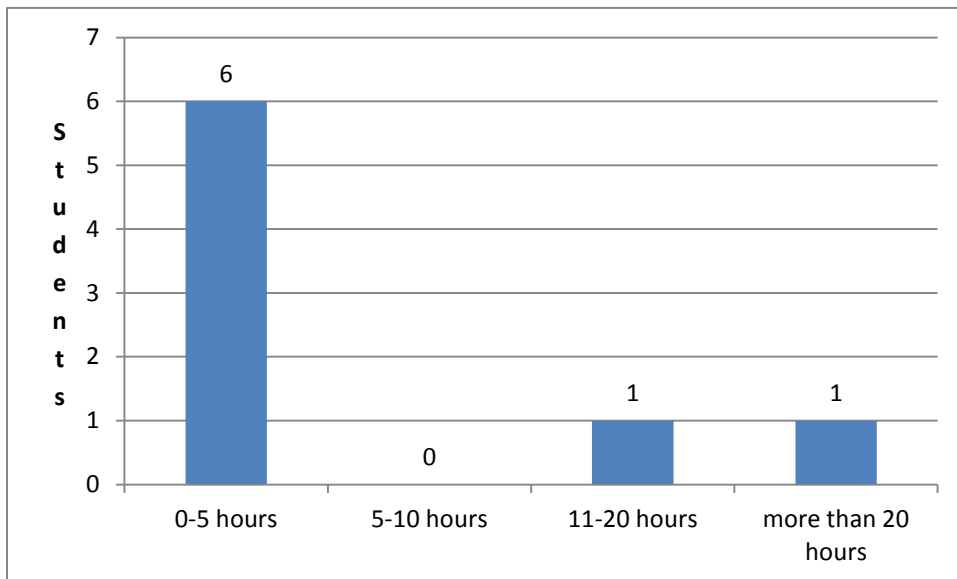


Figure 30. Hours spent weekly playing video games.

Table 20

*Types of Video Games Participants Play*

Type of Games	<i>n</i>
Don't play video games at all	2
Cooking games	1
Wii sports and platform games	1
Role playing, Strategy, Adventure games	4

## Second Life

Six of the eight participants had heard of Second Life prior to the study. Four reported they had logged in once or twice. One participant reported owning or having owned land in Second Life. None of the participants had any other experience with Second Life prior to the study.

### Results of Interviews and Observations

The qualitative data presented in this section was collected from observational data collected as participants were exploring the course design in Second Life, the two follow up interviews. The initial interviews were conducted immediately following the participants' exploration of the course design in Second Life.

The participants with dyslexia were asked a series of questions about the difficulties they experience in classes because of their dyslexia and how the course design addressed these difficulties, if at all. Additional probes based on the participants' responses varied slightly from interview to interview. However, the probes were still similar across all interviews.

Though the questions in each interview were very similar, each participant focused their responses differently. Some participants' responses were more concentrated around a smaller number of themes, while others' responses were less focused and covered more themes. Once the transcripts were coded, the top four themes in each interview were determined by the percentage of text coded with the theme. These themes were then aggregated across all interviews to look for similarities and common themes.

The top theme prevalent across all interviews was discussion of technical issues associated with the course design. For five of the eight participants, this theme was one of the

four most prevalent themes in this interview. Issues participants experienced with the mechanics of the Second Life environment (walking, camera controls, flying, interacting with objects in the course, etc.) was also a prevalent theme in three participants' responses. Interaction with people was a prevalent theme in three participants' responses as well. Discussion about design distractions was prevalent in two participants' responses. Difficulties with evaluating the design because it was not a live class with other students present featured in two participants' responses. Discussion of the course materials was prevalent in two participants' responses. Additionally, two participants' focused on the ease with which they were able to find materials and activities within the course design.

Though there were similarities across all interviews, as discussed above, each participant was unique in how prominently the themes featured in their responses. Additionally, several themes were prevalent in individual responses but not repeated across all interviews. Each participant's responses are discussed below. Participants' names have been changed to protect their privacy.

Rachel, 35, Female, Pre Pharmacy Major, No Learning Disability

The primary focus of her responses in her initial interview focused on the variety of ways available in the course design for students to access course materials. Below is an excerpt from her interview where she was asked what she liked about the course design she had just finished exploring.

Rachel: Just the fact that there were a lot of different ways to get through the materials. I mean, you could open up just one thing right at the beginning there and just keep going through all the material if you wanted without ever touching another thing in the environment. Where's the fun in that? Got to go play with things! Or you could break it up into smaller, bite sized pieces that are easier to digest.

Researcher: Mhhmhh. So you liked that you could choose how you were going to access the materials...

Rachel: Right, because there are times where I want to be straight forward, go straight to it and get everything I need in one big chunk. Then there are times where I'd rather kind of do things the nice, lazy way and break it up a bit, not have to think quite so hard all at once.

The second most prevalent theme in Rachel's response was discussion of the technical problems she experienced in the course. She talked about some course items that did not load, including web pages and pdf files. She also discussed that she was unable to post responses in the discussion areas. Her inability to participate in the discussion appeared several times in her responses.

Rachel's responses also focused on the repetition of material built into the course design. She felt this was a definite advantage to the design, as illustrated by her response,

The layout of the course, it seemed fairly straight forward. There was a lot of duplication, which can be a good thing because you don't always necessarily look in the same place for something. You can click on the screen. You click on the apple or and what have...you'll get to the same place. That if someone's first urge is to go for one thing they still get the material without having missed anything.

The fourth most prevalent theme in Rachel's first interview was her suggestions on how to improve the course design. When she was asked what changes she would make to the course, she responded with the following, "Might include something like some more, some shorter video clips that demonstrate...like there were limited examples out to the right of the various communication techniques. It might be easier to keep it in mind actually seeing it and hearing it rather than reading it." She also stated that voice communications within the course would be helpful. "With the communication thing, yes you can communicate online, but a lot of things get lost in the translation when tone of voice is gone, so being able to have verbal communication between the students would probably be incredibly useful."



Billy, 25, Male, Mechanical Engineering Technology Major, Learning Disabled

Billy is diagnosed with dyslexia along with several other learning disabilities. His responses in his first interview centered on a much more concise list of themes than the other participants. Additionally, his responses are somewhat evenly distributed across the themes. However, there were a few themes that featured more prominently in his responses. The primary focus of his responses was on design distractions, specifically the ability to fly and move around Second Life without restriction, as the excerpt below illustrates.

Billy: The fact that I could just, in Second Life, get up and fly away to anywhere else in the world, at any time.

Researcher: Ok. And that's something you didn't like about it?

Billy: Yeah. And I could very easily just wander off. A classroom or learning environment needs to be somewhat more constrained in order to not be distracting. Back on the previous question, flying would be a distraction.

The second most prevalent theme in Billy's first interview was discussion of technical issues he experienced in the Second Life course. He had some difficulty getting items to load properly. Additionally, he experienced issues with interacting with certain items. He also complained about the mechanics of moving and interacting with items in the Second Life environment. The controls do not work like the games he spends most of his time playing. However, these differences in controls did not prevent him from exploring the environment or interacting with objects and course materials.

Billy also discussed the difficulties he experienced with attempting to evaluate the course design in the current study design. Because there were no other students in the course with him, he was unable to evaluate the interactive possibilities between his avatar and those of other classmates. He also found it difficult to fully evaluate the materials and course activities because they were not part of a live course.

Finally, Billy was one of two participants who stated they felt there was no advantage to using Second Life to deliver the course design in the study. Because the course materials were available through the website associated with the course, he felt that he would just use the website and not bother with the virtual environment, as illustrated by the following quote, “most of the course materials seemed to be accessible through the first website that you get to from anything, so moving around in the actual Second Life area seems unnecessary.”

Deborah, 23, Female, General Studies Major, Learning Disabled

Deborah has dyslexia as well as another learning disability she referred to as writing expressionism. The primary theme in her first interview was discussion of the videos in the course design. Deborah’s second most prominent theme in her responses was discussion of the course materials. She reported that she felt the course materials were easy to understand, enough so that she did not have to watch the videos in some cases.

As Deborah was the first participant to go through the observation phase of the study, she was not informed prior to exploring the course that the design consisted of only what was inside the garden walls. Consequently, she explored many of the other buildings on the island and became somewhat disoriented and unable to determine what she was to do in the course. Additionally, she was confused by the skyboxes in the design. She did not understand that they were free floating structures, as illustrated by this quote, “I was trying to figure out what building were we watching from for the library and then for the Zen garden, cause it didn't really correspond with any other buildings around.” Her discussion of this confusion was the next most prominent theme in her first interview responses. Because of her confusion, the other participants were informed about the boundaries of the course design prior to their exploration of the course.

Deborah also had technical issues in her exploration of the course. She had difficulty getting pdf files and some videos to load. She also mentioned problems with interacting with the help bots. In discussing the pdf files that would not load, she had said, “Some of them wouldn't open. I asked one of the little figures, but the figure never answered me, so I'm like, ok.” Her discussion of these difficulties was the fourth most prevalent theme in her first interview responses.

Jack, 26, Male, Business Computing and Information Systems Graduate Student, No Learning Disability

Jack's interview responses were very brief, as was his exploration of the course design. The most prevalent theme in his responses was discussion of design distractions in the course. For example, when asked what he found distracting about the course, he gave the following reply, “When I was up in the Zen garden, I saw a bunch of buildings, and I was like, ooh, what's in that? I wanted to like, I thought about jumping off the Zen garden and running over to them. But I was like, no, I can wait.” Additionally, he felt many of the details in the environment were irrelevant and distracting, as illustrated with the following quote,

It's one of those things whenever like a level designer in an MMO designs stuff like chairs to sit in, I'm like, I actually don't care about sitting down in the game. 99% of the time it does not matter. ..But i don't think anyone is actually going to sit down around the conference table unless it seems somehow beneficial.

Jack's second most prevalent theme was what types of classes he thought would work well in the course design. In his opinion, the course design would be effective for teaching scripting classes. He felt the Second Life environment would be very good for these types of classes because students would get immediate feedback on their scripting as they work in the

environment to build scripted objects. Additionally, he felt that courses with visual elements such as art design or visual design would work well in the course design.

Jack also disliked the way information was presented in the course design. He did not like the course materials split into topics and physically separated around the garden, as illustrated by this excerpt from his first interview:

Jack: The way the course is laid out I didn't necessarily like. I should say, I guess I would prefer a more centralized screen that I could just go, press this. Access what you want from a course menu of all the contents. Rather than ok, I have to walk across and teleport up to the Zen garden to find what I was looking for.

Researcher: So you didn't find any of the materials around the tree in the center of the garden?

Jack: Oh, I did. It's just like, I would prefer all the materials to be in one place. And it seemed like all of the screens had different information on them.

Researcher: They did, but you could get to all the materials from all the screens.

Jack: Oh, I didn't mess around inside the website. I just clicked on the screens and opened up the page.

Finally, Jack discussed the difficulties he had adjusting to the mechanics of Second Life.

Here is how he described the issues he had when he first logged into the course:

Initially, my character was walking backwards and the camera was stuck like looking at me face on. Which just taught me to switch and walk backward rather than figuring out how to work the camera. Then at some point, I hit escape and it switched the camera to normal. I'm used, in most MMOs, holding down right mouse to adjust camera, but that appears to interact with objects in Second Life, so that was kind of irritating. I kept trying to move. I basically treated it like moving in an MMO and a couple of times, like, it didn't work that way. I've played quite a few MMOs. It would be like, and I look over...oh (sound of frustration).

Cheryl, 25, Female, Sociology Major, No Learning Disability

Cheryl was the only participant with a limited amount of experience in Second Life prior to the study. The most prevalent theme in her first interview responses was the technical issues

she experienced while evaluating the course design in Second Life. She had difficulty accessing some objects because of permissions issues, and she could not open the PowerPoint files associated with the content areas.

The second most prevalent theme in Cheryl's first interview responses was her discussion of personal interactions in the design. She felt the Second Life environment, and the avatars in particular, would afford better interpersonal interaction and communication than more traditional online course models and environments, as illustrated in the excerpt below:

Cheryl: I like that you have a separate group work area where you and the other people work. Uh, and then just the teacher, uh, like the meeting spot for the professor was a great idea. I really liked that. That way you don't have to worry about, if they have virtual hours, you don't have to worry about coming up to campus or waiting for them to respond to your email. If they're there..

Researcher: You can just log in.

Cheryl: Yeah. You can just chat with them right there if you have a quick question.

Cheryl also felt the course design in Second Life made finding course elements and navigation very easy. This was the third most prevalent theme in her first interview responses. When asked for her overall thought on the course design, she replied, "I liked it. It's very, it's very easy to navigate." She went on to expound further in the following excerpt:

Cheryl: It was all right there. I liked the little foursquare style in the middle. I could just keep walking around it. It was in one central place. You don't have to...I didn't have to run all over the place, didn't have to, to find everything. It's all very easy.

Researcher: That was kind of the idea but we weren't sure it was going to work.

Cheryl: Yeah, it worked great for me. I looked at it first, and zoomed out a little bit and saw that it was four little boxes. And I clicked on it and it brought me into the next thing. And it was nice to be able to navigate through the page online, too. If I wanted that option, if I didn't want to go to the next spot in Second Life, if I just wanted to go through the left side panel, the links on there, I could do that as well. I liked that option.

Cheryl has extensive experience with online classes, having taken more than 6 completely online classes in her undergraduate studies. She used her experiences with her

previous online classes to compare them to the course design in Second Life. Her discussion of these differences is the fourth most prevalent theme in her first interview responses. The following excerpts illustrate her thoughts on these differences:

Researcher: What did you like about the course?

Cheryl: I liked that it wasn't just a standard Blackboard course. I have taken a lot of online courses and everything there, and no matter how much effort the professor puts into making it different, it's still the same. There's no, there is no easy way to chat with your classmates on there. You have to wait for the box to pop up. You never really know if they are online or offline even though it says they are online. And this is just, you can see people there, you can ask a question, and you can have an extra little pop up box just for them.

...

Researcher: What changes would you make to the course?

Cheryl: I didn't find anything that I would change. I liked the Zen garden, the option to be outside or be inside a little box. It just seemed very relaxed. I didn't feel like I was pressured to. It made me, like, it made me want to stay on there and look around and see what I could do. Whereas in my Blackboard class, I want to get my stuff done and get out of there as soon as possible. And I dread logging on to Blackboard because I don't want to see the messages or the alerts that I have...With this, it's just, it's fun, so I wouldn't change anything.

Irene, 21, Female, Foreign Language major, No Learning Disability

Irene struggled with the mechanics of the Second Life interface significantly more than the other participants and discussed these difficulties more prevalently than anything else in her initial follow up interview responses. In the following excerpts, she describes some of the difficulties she had with moving around and interacting with objects in the course in Second Life.

Sometimes when I would click something, it wouldn't go there, it would take me back, and that's not what I wanted to do. So what I was thinking I was doing with my arrow keys and with my mouse, it wouldn't do that, what I was thinking of doing, so I had to click around a lot. So I would say it was hard. But not extremely hard.

...

Irene: ...I thought it was difficult. It kind of made me feel like something was hiding, yeah. When the balls were floating, you know, I kind of started thinking, oh, wait...did I leave something behind?

Researcher: Ok. Like did you miss something when you were going through...is that what you mean?

Irene: Yeah, yeah. Or when there was something behind a wall that was not specific. It had some brighter colors, just like a balloon maybe. It was floating or it was besides of a wall. It made me feel like oh, am I missing something? Did I miss something in the back while I was running around? So it kind of feels like it is secretive kind of. Like, if you are smart, you're going to find this.

...

Researcher: Did you have any other problems besides those?

Participant: Maybe the clicking thing. Um, maybe it needs to be a little more clear on when I should double click or you know, maybe there should be another key that would tell me, if you absolutely click this button, number 1, you will talk to that person. But I found myself doing all sorts of left clicking, right clicking, pressing the up arrow, trying to do something. So I think that was a problem. I would just get frustrated and leave...

Irene's second most prevalent theme was the technical issues she experienced in Second Life. She reported having difficulty opening some web pages and PDF files. Additionally, she was unable to view some videos, including those related to the discussion topics.

The third and fourth most prevalent themes in Irene's responses focused fundamentally on interpersonal interaction. She discussed the difficulties she had in evaluating the design because it was not a live class with other students and the instructor in the space.

Researcher: Could you figure out what you were supposed to do?

Irene: I could see from, little details saying, you know, class group. I remember from the video it said this would be a good place to interact or find classmates. And I went there, and I think there was only one girl that was sitting down.

Researcher: Yeah, there were no other students in the class right now.

Irene: Oh, I see, Ok. Well, I think I clicked on her and it said sit here or take a nap here so I said Ok, I'll sit here. Then I got up, but I didn't have interaction.

Researcher: That was me, actually.

Irene: I just, if I would have clicked on you, would you have talked?

Researcher: Yeah, if you had typed anything, I could have seen you and could have chatted with you that way?

Irene: Oh, I see, well, I guess I didn't...because I done it with the other guy maybe or someone else. And I would say...they would say Hello, Avatar. And I said Hi, and no one else responded so I thought it would be the same with her.

Researcher: Yeah, I can understand that. She was actually live, the other two were bots. There's not a human involved there.

Irene: Ah, because how I would have known that.

Researcher: Do you think it would have been better if you had had other people to interact with?

Irene: Absolutely. It feels like it's lonely without anyone there.

Liz, 29, Female, Human Development Major, Learning Disabled

Liz has dyslexia and struggled with the mechanics of interacting with the Second Life environment and user interface, and her discussion of these struggles was her primary theme in her initial follow up interview responses.

Liz: I had a little trouble navigating. Once I walked into a wall, but other than that, it was pretty

Researcher: Have you ever been in Second Life before?

Liz: No. It took me a little bit to get used to also just right clicking on what you wanted to touch instead of left click. But once I got that, it was easy.

...

Liz: ...I was trying to click on one of the apples, but I couldn't quite navigate to it. There was three apples in the area, then my avatar was standing like on top of an apple. And I wanted to get the one that was in front of me but I couldn't get it because it was directly in front of me, so I think I like moved to side, but when I moved to the side, another apple was revealed. Then I was like, which apple I was clicking on...I don't even remember. So I just clicked on a few of them and... But it would be cool if the apples all have different content.

Researcher: They are supposed to. All of the apples have different content.



Liz's second most prevalent theme was unique to her. She was the only participant who spent significant time during the initial follow up interview discussing the difficulties she experienced in her classes due to her dyslexia.

Researcher:...what kind of problems do you usually have in class related to your dyslexia?

Liz: Sometimes my professors speak too fast, and I can't write as fast as they're talking, and it slows down my writing. And sometimes when I'm reading, I mix things up. I'll move letters around and I'll read something and think it's some word that it's similar to but it's not that word. I have problem with distance, too. That seems to bring about a lot of problems with my dyslexia. I get confused on letters...they look different to me, so I can't understand words...

Researcher: If they're too far away?

Liz: Yeah, if they're too far away, so I have to wear my glasses for driving and for distance like looking at boards and stuff.

Researcher: Ok. Did you see any of those problems as you were going through this course?

Liz: I didn't have a lot of those problems. I did notice there were a couple of typos. One of them I had to do a double take on because it looked backwards to me, but then I read it again, and I was like, wait, it is backwards.

...

Liz: Sometimes if I'm reading a word, and the word is supposed to end in el, sometimes I'll write le instead. Sometimes I'll make common misspellings like that.

Researcher: Ok. So when you were looking through this course, were those problems prevalent?

Liz: I didn't really notice a lot of it. I guess some of it I like double read, but I've gotten in the habit of doing that when I read. If there is a part that doesn't seem quite clear then I'll go back, but I think, for the most part, I just read everything once. I like that I was able to read it at my own pace and kind of go through it slowly.

Her discussion of the course materials was the third most prevalent theme in Liz's first interview responses. Liz has had some training as a special education teacher, which shows in her discussion of the course materials and how they meet her needs as a learner. She felt the materials were easy to understand and the length of the readings was appropriate. In the

following excerpts, she also briefly discusses the videos and assignments included in the course materials.

Researcher: Did you find the material easy to understand?

Liz: Yes.

Researcher: How about the length of the reading, was that ok?

Liz: Yeah.

Researcher: What did you think about the videos and the other content that was in there?

Liz: I liked them. I liked that things were short, sweet, and to the point. Very concise so it was easy to read but still get all the information.

...

Researcher: What did you think about the rest of the material and the assignments?

Liz: I liked the assignments. It seemed like some good critical thinking skills would need to be involved. I liked the lessons, it was a good topic...something I think most people would benefit from.

...

Researcher: Did the videos help with any of the understanding?

Liz: The videos helped, too. I figured out I didn't have to read the content, so it didn't trip me out.

...

Researcher: What did you like about that course?

Liz: The videos were comical. And I liked that none of the reading was really long. Sometimes when I do a lot of reading on the computer, it really hurts my eyes. I didn't have that problem because things were condensed.

...

Researcher: Did you get to look at the review screen?

Liz: Yes.

Researcher: Was that too long, or was that ok?

Liz: No, I liked it. It seemed like everything was covered again. I like that because when you are reading in the textbook or whatever, they will give you that summary at the

beginning and then a summary at the end. And then the content...you kind of did that on there, too, so you went over everything a couple of times so that it gets in your memory. I liked that it repeated like that so you could retain it.

Finally, Liz felt that the course design made finding things in the course very easy.

Because the elements were all visible from the main course area, she did not have to struggle to locate them, as she does in more traditional online classes.

It was pretty easy to find everything. Most of it was in the center and what wasn't was in the four corners, so it was neatly laid out...Like I said, I think it was really easy to find things because of the way you had it tabbed and laid out.

...

I thought it was pretty well laid out. I liked how the tabs and everything made it easy to follow.

...how it was organized on the site, you could click through everything pretty easily from beginning to end on the lectures and then also how everything was arranged for the course with the calendars and the discussion and everything. It was easy to find everything.

Nathan, 19, Male, Sociology major, No Learning Disability.

Nathan had no interest in playing video games or online games of any kind. His responses to the first interview were unique from the other participants, only overlapping on one theme with the responses from the rest of the participants. Nathan had taken many classes online prior to the study, but he had no prior experience with Second Life. However, he seemed fascinated with the Second Life environment and the technical capabilities it contained. He spent more time asking questions about Second Life than anything else in his first interview responses. He was particularly interested in interacting with people globally and how the virtual environment reflected the real world, particularly the passage of time and night/day cycles.

Nathan spent some time discussing the group project in the course design. He did not like group projects in general, but he thought the group project in the course design might be more interesting and fun, as illustrated by the excerpts from his responses below:

Nathan: ...I do hate group projects because you have to rely on other people. And so that can be difficult. But I know it is easier for the grader to do than...and if it's done right, you do learn more in groups of people. So, just in personal taste, I don't really like group projects, but I know that there are benefits to it.

Researcher: But you said earlier that you kind of liked the group project in this one. Why? What's different about it?

Nathan: Because I would hope, at least, people would be more interested in it because it does, it does take, uh, pop culture and make it relevant. It kind of makes it fun. I mean, um, yeah, so, I think that, as far as group projects go, it's more fun.

Nathan was also very interested in the possibilities for interpersonal interaction within Second Life. He felt being able to see and interact with the avatars of other people would be beneficial.

Researcher: And I saw you explore like the professor's office and a couple of different areas.

Nathan: It's really bizarre. I mean, in a good way. It gives you a more, like, accurate approach to real life. Like, I don't know, something that's really frustrating with me is, in online classes specifically, you don't know what's going on. Like there's, Dr. Dash is the only person I've ever had who's had communication in her classes. And the teachers are kind of neglecting, in the sense of how they can communicate with the teachers, and so to actually tangibly see the professor sitting in a desk, knowing that their there to talk. That's really cool. And the fact that it's kind of serene. There's harp playing in the background and actual chairs to sit at. But how, I don't know that works. If the teacher is sitting there, can you talk through headphones?

Researcher: Yes, you can. You can either chat in text, or if both of you have a headset with a microphone, you can actually talk like we're talking right now.

Nathan: Yeah, I like that. I think that's really cool. Cause it's tangible.

...

Nathan: Again, I think it's the same with the teacher area that tangibly be able to sit down and have the capability to talk with someone and be able to communicate with them. I see that being really effective. Again, and I'm just talking from online classes, you want to communicate with someone. Especially in online classes, people want to, I think the

students do tend to want to learn the material, so to know that there's someone there that can talk to you, and like, you can study together without having to meet at the library or...I mean, because I know people are nervous about that. And it's also, I mean, say someone lives in Denton, they don't want to drive all the way to, you know, Denton or they don't want to give someone their phone number. It's just a safe, tangible way to get the materials done and learn more with other students.

Nathan also felt that additional opportunities to interact with the Second Life environment as well as other students would be beneficial to the course. He recommended having the students build a space where they could meet and interact inside Second Life. Additionally, he felt that increasing the size of the course area would allow for more interactive opportunities, which would make the course more fun.

Researcher: Are there any other changes that you would make?

Nathan: Um, I don't think so. Just more capabilities of doing things. Granted I don't know how much time i would spend if it was a class but it'd be cool to look around. Or maybe allow the students, and again I don't know how this works, but allow students to build things.

Researcher: They can.

Nathan: And so it would be cool to have the capability to do that. And like you could make your own notes and post them on a TV. And then have other people look at them. So that would be something that would people would be encouraged to do.

Researcher: Ok. And you said other capabilities. What did you mean by that? Being able to do more things? or more space? Or interact differently? or?

Nathan: Um, more capabilities as in more space and building more things or even doing things like flying. That would be kind of cool. But, yeah.

Researcher: So basically being able to interact more with the environment?

Nathan: Yeah. And then maybe there's like, classroom meetings where everyone meets together. Like, build a classroom. That would be kind of cool. Where it could have like a huge Zen garden where everyone could like sit together and have that like water playing in the background like up on the top of the building. I mean, tiny things like that could be cool.

Researcher: So you are thinking about creating a space specifically where the whole class can come together.

Nathan: Right.

...

Researcher: What changes would you make to the course?

Nathan: Um, I don't know. I mean, again, obviously the size because that would be fun.

### Second Interview

Once each participant had a chance to review the transcript from his or her first interview, the second follow up interview was scheduled. This interview sought to learn more about each participant's past school experiences as well as their experience playing video games and online games. Additionally, they were asked about their prior experiences with online learning as well. There was considerably more overlap in the participants' responses in the second interviews than there was in the first interviews. In the subsequent sections, the most prevalent themes across all participants' responses will be discussed and illustrated with excerpts from the interviews. Finally, the differing unique themes will be discussed and illustrated with excerpts from the interviews.

As with the first interview responses, the top four most prevalent themes in each participant's responses were recorded. Then each theme was color coded to allow themes across all participants' responses to be more easily seen.

### Difficulties with Prior Classes

When the analysis was completed, participants' discussion of the difficulties they have experienced in prior classes emerged as most prevalent across all responses. The most common complaints participants had about their previous classes were that too much information was presented too quickly and there were not enough hands on practice opportunities. Some participants also commented on how their interest in the subject matter affects their level of

success in the class. Additionally, all three participants with dyslexia reported difficulties in keeping up with the reading and writing requirements of most classes. In the following excerpt, Liz discusses the importance of repetition and practice for her learning success.

Liz: I like everything. I like to learn. I have taken courses I didn't like because of the way in which the material was presented to me. Either too fast or I didn't get a chance to interact with the materials as much or to try things out as much. I do better when the professors give you a chance to practice things a lot and not so good when I decide to just learn it in a day or something. If I have a chance to practice it and I have someone go over it, it's a lot easier for me.

Researcher: Ok, so repetition is really important to you.

Liz: Yes.

Researcher: Also, hands on or? Does it matter what kind of practice it is?

Liz: I do really well if I have hands on a lot of times. It's tricky for me with like geography, geometry to do hands on because I get...if I don't have hands on with geometry, it gets really difficult for me because if you just draw it on a piece of paper or if it's just in a text book, I flip things around a lot, so if they're asking me to pick which parallelogram matches the other parallelogram sometimes I choose the wrong one. But if I have a chance to actually manipulate the materials it can be a little bit easier, although sometimes that's still challenging for me.

Deborah was unique in one type of difficulty she experienced in several classes. She believes the difficulty is caused by her learning disabilities. She reported having a lot of trouble visually recognizing letters and symbols. In some cases, she reversed them. In other cases, she was unable to distinguish between certain letters. In the excerpts below, she explained these difficulties.

Deborah: Chemistry was because I mix up hydrogen and helium and the dual bondings. Especially when there's random letters and they are very similar and I'll mess up the whole chemical makeup of certain things. Glucose was my downfall. You have to get it right in a certain order in rows of certain letter and numbers...A's and 6's...I hate A's and 6's. All the tests were typed in Times New Roman...if you can see my issue.

Researcher: Yeah. They look really close. Do you think it would have been less frustrating to you if your professor had used different fonts?

Deborah: Yes. When I made it to Pre-Calc, the teacher used Comic Sans the whole entire time, and I never confused anything because you have the lower case a, it doesn't have the little curly queue on top and so the numbers are distinctly different than words. It was just a font change that made everything make sense, which was sad.

Researcher: It's sometimes frustrating when small things like that are...

Deborah: That's how I made it through Calculus 2, because at NCTC, they just write all their tests out and just copy it.

Researcher: Handwritten?

Deborah: Handwritten.

Researcher: So you can see the...

Deborah: Yeah, because her a's would be in cursive and the n's would be in cursive so I could not mix that up with anything else.

Billy also reported having difficulty being motivated to complete his homework in most of his classes.

Billy: In classes it would probably be remembering to do homework. Getting encouraged enough to do the homework especially when it's not a lab or graded homework. And reading textbooks. Which I have not done in a long time. I get through my classes learning from other people.

Researcher: You mentioned getting encouraged enough to do the homework. What encourages you to do the homework?

Billy: If it's something that I actually enjoy or if it's doing something. As opposed to just calculations.

Cheryl discussed the difficulties she had with managing and comprehending classes with a lot of information, such as science classes. In the following excerpt, she explained the problems she had with science classes.

Cheryl: I get that Biology is the body or bones or organisms and cells and everything. I understand that chemistry is proton, neutron, electron but putting it all together that I just get so frustrated about it and everything starts spinning in my head and it doesn't make any sense.

Researcher: You can get kind of the pieces...

Cheryl: Yeah.



Researcher: But when you try to look at the big picture, it gets overwhelming.

Cheryl: Yeah. Exactly. There's just too much there.

For Irene to be successful in the class, the materials must relate to her experiences in a practical, meaningful way. She also disliked subject matters with concrete answers, preferring instead classes with more open ended or creative answers. In the following excerpts, she explained both of these points.

Irene: I absolutely hate classes that just give you material to read and the student has a hard time applying it to life. The class I'm thinking of right now is World Literature, which is English and I happen to love English, but this class in particular was just dreadful because we had so many passages or books to read in one night. The next day they would quiz you on where the chair was in this line. They are out there to get you. If you didn't catch where the chair was or what color was the peacock...you failed the class.

Researcher: A lot of really fine details.

Irene: With no real value whatsoever

Researcher: seemingly irrelevant details

Irene: Yes. Now if she would have asked something like how would you react in that situation...making me think of the world and making me think of myself and how i would react to other things. That would have different.

Researcher: It would have been better if the professor had tried to make the material relevant to you and to your world.

Irene: Yes.

...

Researcher: Are there any particular subject matters that you like the least?

Irene: Math/biology.

Researcher: What makes those classes so unlikable?

Irene: You have to be specific. You have to have a certain answer.  $2+2$  is 4. It can't be anything else but 4. And biology, too. You have to calculate how many chromosomes you have, and I do not like calculating. The reason I love to cook is that you don't have to measure.

Researcher: So you prefer classes where you can either have more creative ways of expressing your answer...

Irene: yes, yes.

Researcher: There's not always necessarily one right answer...

Irene: Right. I like open ended. There's a lot of possibilities.

...

Irene: I never liked math since I was a little girl. Math was not my friend. A lot of it has to do with only having one answer. I know you can have fractions and decimals that mean the same thing, but you have to be exact. You can't miss a milligram because the elevator won't work. You have to be very precise, and I really am not very precise.

### Advantages to Online Classes

The next most prevalent theme across all second interview responses was discussion of the advantages to online classes, primarily in the responses by Irene, Liz, and Cheryl. All three stated that they really liked online classes because of the scheduling flexibility taking online classes afforded them. Cheryl commented that taking classes online gave her a more flexible work schedule as well as more flexibility overall.

Cheryl: I prefer online classes. I do like face to face classes, but I like the freedom to do what I want, when I want with the online classes. But I don't like the kind where they just put up PowerPoints. I want the information given to me as if the teacher were talking to me in class.

Researcher: What online classes have you taken?

Cheryl: I've taken quite a few. I've taken Art Appreciation, Nutrition. I attempted to take Biology online. That didn't work out very well. I've taken World Lit online. This summer I'm taking ?? Christianity online. A lot of my Sociology classes, they offer them online. So I pick those up and it gives me a more flexible work schedule.

Researcher: Is that one of the reasons you like the online classes?

Cheryl: I do. I really like it because I can...my week always gets away from me, and I always run out of time, but with online classes, I can use my Saturday to work on a chapter. I'm a night owl. I can take my tests, instead of in the morning, I can take it at midnight, and that works better for me.

Researcher: What do you like the most about the online classes that you've taken?

Cheryl: That, the flexibility. I didn't like them at first. I didn't understand them and it was hard to grasp what the professor was trying to say because you're not in class with them. That got better over time, and now I love the flexibility of it. It makes it so easy to sit in my Pjs at home. I don't have to worry about when I'm going to work.

Liz appreciated the scheduling flexibility online classes afforded her as well, but she also liked the self-pacing in online classes. In the following excerpt, she discusses how this self-pacing has benefited her.

Liz: It used to be I had the most difficulty with math, although after finding the online classes, ?? I used to make C's or D's in math in high school. I had a really hard time following it, had a hard time just keeping up. Once I found the online course, things went really smoothly for me. I started making As.

Researcher: What was different about the online classes?

Liz: I could go slower. I had a professor in there who could answer any questions I needed. He just kind of circulated the classroom, so it was kind of more one on one. And then also, I could take the class at school during class time and then at home I was able to work through as much of the material I wanted to as quickly as I wanted to. So that was helpful too because I could go slow if I didn't understand something and repeat it over and over until I got or I could go quickly if I did get it. So it just helped me to really master the material.

...

Researcher: What do you like the most about online classes?

Liz: I really love the self-pacing. You can review the material as much as you need to. For me it's important that I can hear it and see it. Those two components really help me learn.

Researcher: Anything else?

Liz: I like that most of them seem to be self-paced so that you can finish them at your own rate. If I need to go slow or I need to go fast, I can do either one of those things. And if I have extra time, I can go a little bit forward. That's always nice, be able to do things when I'm able.

Researcher: A little more flexible?

Liz: Flexibility is nice.

Irene also appreciated the flexibility she gained from taking online classes.

Researcher: What did you like most about your online classes?

Irene: That I didn't have to show up for class and that you had the liberty of doing things in your pajamas and you can also pause and answer a phone call or pause and eat. When you are in class, you have to give your attention. It is rude to be talking on a phone call. Even getting up...sometimes I don't like doing that. I like to give my full attention to someone if they're talking to me. So when it's online, no one's there to watch you. You can be eating in your pajamas and watching TV at the same time and still doing your class. And I really like that liberty.

Researcher: So it's more flexible...

Irene: yes, yes.

Additionally, Irene felt online classes afforded her more opportunities for practice and feedback. In the following excerpt, she discusses the differences in her learning experiences between a face to face math class and another math class that had an online homework and practice component.

Irene: You're intimidated. There's so many people in this class. You are sitting right next to each other bundled. You don't want to look like an idiot. And then the next morning, people would come in and say oh, I got my homework in on time. I got a 100 on it because I was telling it to help me.

### Favorite Classes

Discussion of their favorite classes was the next most prevalent theme, primarily in the responses from Cheryl, Jack, and Nathan. Not surprisingly, classes with hands on practice and opportunities to apply the concepts being learned were highly favored among the participants.

Jack: Typically, I enjoy classes that are pretty hands on. I like to have the teacher kind of explain the concept and then go, ok you guys do it, typically in the class so I don't go, oh, how do I do this and not be able to ask for two days.

...

Researcher: What do you like about these types of classes?

Jack: Like the ones I was talking about?

Researcher: Yeah, the kinds of classes you enjoy the most.

Jack: Pretty much that I can...I learn well by doing the thing. As far as being like, well, what happens if I don't do it exactly the way he said? What step can be cut out of the process and still get the same results? And sometimes you don't get the same results but there's some other background reason. I like figuring that stuff out, too.

Researcher: Ok. So you like the problem solving aspect a lot, is what it sounds like.

Jack: Yes.

In Nathan's case, his favorite classes were either online classes where he had greatest control over his learning or classes with subject matters that were interesting to him.

Nathan: Approach wise, I like on-line classes. The reason for that is that I kind of prefer to take responsibility. I prefer to have my work done and know what I'm supposed to be reading and rather have more reading than have to take lecture or something that I'd have to go to so I learn better through distance learning... and then subject wise, I like soft sciences.

Cheryl's favorite classes were a bit of a dichotomy. She reported liking math and sociology classes for seemingly diametrically opposed reasons. In the excerpt below, she discussed her thoughts on the matter.

Cheryl: I'm a sociology major and thankfully, I really enjoy those classes. I like the classes on culture, collective behaviors. Basically, anything you give me from the Sociology department, I will take it and enjoy it. Yeah, I like math, too. I love math. Algebra. ...I've always been a math fan. I hate sciences. I never could grasp them, but math and English...I was always a good writer, but usually I didn't enjoy the books we were reading. Math has pretty much always been a class one, go to subject. You know when they ask you what your favorite subject is, it's always math...I do better in math classes. Anything that has an answer that's not your opinion or some random theory. Anything that has an answer like  $2+2=4$ , that's fact. Any class like that I can get because it's straight forward and I don't really have to think.

Researcher: So how does that work with the Sociology department?

Cheryl: It's actually kind of the opposite of everything I've been good at. I'm interested in the information. I'm not really sure why I like it so much. I'm writing papers, essays. I have to think for myself. Nobody's come up with like a formula for me to solve. I have to read an article and use my own words and analyze, and that's usually not where I excel. I have to work for it and struggle with it.

Researcher: Math has always been the classes you excel in?

Cheryl: Yeah, it's always been easy for me. I've always been a grade ahead. When I was growing up, I was always a grade ahead of everyone in math. Easy. Numbers.

## Appropriate Classes for Second Life Course Design

Irene and Billy offered their opinions about what types of classes would be appropriate for the course design in Second Life. Billy felt the course design in Second Life would be useful for some English and foreign language classes, particularly if the students could record the spoken portions of the language classes inside Second Life. He also felt history classes would be appropriate in the design.

Billy: Possibly history classes, especially if they, those could be some interaction. Parts of it could be recreated which would be interesting.

Researcher: There actually are places out on the grid already.

Billy: And then you could have field trips going out to see the Boston Tea Party.

Irene also felt that history and foreign language classes would be appropriate in the Second Life environment. In the following excerpt, she excitedly discussed how she felt the Second Life could be utilized to enhance various types of courses.

Irene: History would be perfect because if you had an environment in which...I'm learning about India or I'm learning about New Zealand, I can just transform and be there. Wouldn't that be cool? Or Paris. You can go all over and visit the Fountains of ?? That would be awesome. History, yeah

Researcher: There actually are recreations of Paris and, I think, Rome. And there is a recreation of an Ancient Roman seaport in Second Life.

Irene: Wouldn't it be cool if you could just touch the fountains and you'd have the history all about it. And you would have the visual aid of seeing that and you would have a sense of direction of where are they. They are facing the museum of whatever or the Cathedral of St. Paul is right beside it.

Researcher: That would be awesome. What else besides history?

Irene: Science would work, too. If you can touch an animal or families walking around, and you walk around and say your son has your nose. And you can say the reason my son has my nose is...

Researcher: genetics.

Irene: Yeah. Even language would work, I think. Like the history theme going on, if you are transported to a certain country in, say, the grocery store. You can interact with

another avatar and say I want some ham. Pretty cool? Yeah, and it can give you a sense of something being real. Rather than just writing I want ham, I want ham, I want ham...that would be pretty boring. And also if the avatar talks. Do you think it could work where the student can talk and they can hear you?

Researcher: It already can do that.

Irene: Oh! You see, there you have it. You have a million bucks in your hand! You can create this!

Researcher: Actually, it is being used for speech classes...not speech...foreign language classes. What some universities are doing is they are actually partnering with...some schools have sister schools in other countries, and they will partner with those sister schools in that other country. The students in that country are trying to practice English and the students in this country are trying to practice whatever other language it is and they will practice together.

Irene: That is wonderful. I think, because I have also taught foreign language, and the students are bored to death when I'm telling them, No. It's are not is. And when I'm teaching another language, and it's hard on them and they don't want to do their homework. They waste their money. But if they had something visual to look at and part of that culture. Like if you are learning Spanish, travel to Spain, maybe an environment that represents Spain and you being able to talk to someone else. And you don't have to travel to Spain, which would also be good, but you get my idea.

Researcher: Yes. The only challenge with those classes is the time zone differences and trying to find a time when both student bodies can be online at the same time.

Irene: But even within those classes, though, you can still have students within one class here in the United States, the teacher maybe monitoring and seeing where each one of them goes. One of them will go shopping for shoes. One of them will go shopping for ham. They can do different things.

Researcher: Again, bringing it back to making it relevant to real life.

Irene: That will take some work, yeah.

Researcher: But the simulations like you are talking about give students a practical application of what they are learning versus translating on paper. Going to the supermarket and asking for whatever it is they are asking for versus reading about it in your workbook.

Liz: Yeah.

Researcher: Ok. Yeah, they actually do a lot of simulations inworld. There used to be a biology sim where you go and actually walk around inside a cell. Rather than staring at it under a microscope, which you could still do because you want to be able to see what it really looks like in the real world. But in order to learn the parts of the cell, they made

this gigantic cell and shrank the avatars down. And the avatars could walk around inside the cell. So the teacher basically taught the lesson on the structure of a plant inside a plant cell.

Irene: It would even be cool, too, if you could show them first with a microscope and then with the avatar and then with the microscope again. It would be totally different perspectives on how they view the real thing.

### Least Favorite Classes

Nathan and Cheryl spent considerable time discussing their least favorite classes. Nathan stated that the classes he liked the least and he struggled the most with were math and philosophy. Interestingly, he intended to continue on to get a Theology degree after graduating with his Bachelor degree. Below is the excerpt in which he discusses this seeming anomaly:

Researcher: It's kind of interesting that you don't like philosophy given that you want to go into Theology.

Nathan: Right.

Researcher: Do you have an idea, like, how that works in your mind?

Nathan: Yeah, I think it's that it is not fair to say I don't like philosophy; it's that I don't like how philosophy's necessarily taught at UNT. It's very ...I don't want to say biased. It's not biased, it's not presented in a way where all sides are able to communicate and there's not a lot of focus on... Like I understand the whole basis of philosophy is "why" and asking questions but there's never any... I don't know..?

Researcher: Sound like maybe you feel their presentation of ideas isn't balanced?

Nathan: Yeah. There's an attempt to be balanced, it's not even the subject necessarily but I guess how it's presented and the way people interact in that kind of setting. So I'm all for reading whatever someone puts in front of me no matter what their beliefs are, but the second for no reason you call my thoughts stupid, I don't respect you. I guess that's the problem I have with it. I do enjoy reading those types of things on my own. More so political philosophy, stuff like that. I think it's just my own bitterness that it's impossible to have a civil conversation about something that's obviously controversial.

Nathan also mentioned that he struggled with history courses, especially World History.

Nathan: ... And as far as history goes, World History in general, like at UNT there's one from like beginning to... It's separated into two different courses and so World History's



kind of challenging for me. I don't know why. I think it's the broadness of it. It's kind of a difficult subject for me.

Researcher: Just the broad topics?

Nathan: I think it's hard for me to tangibly understand it, whereas if you give me American History or like specific to like to 1865 or like topical history like Church History I can get those things but I don't know, I think World History is pretty difficult for me.

Researcher: Kind of unapproachable or not relevant?

Nathan: No, they're relevant. I think kind of how my head works is I need specific details to just kind of sort things out and remember them and I've just always had a problem with world history 'cause there's a lot of stuff. Like in American History if you talk about you know the Nixon Administration, there's so many things that fall under that it's easier to compact them and remember certain things and certain years whereas in world history there's so many things going on it just doesn't seem the exact same to me in that topic.

Cheryl's least favorite and most difficult classes were science classes, though she also struggled with history and government classes as well. In the following excerpt, she discussed why she felt these classes were so challenging for her.

Researcher: What classes do you like the least?

Cheryl: Science classes. Chemistry, biology, physics. I don't understand. A lot of it is just over my head, no matter how hard I study. It's completely over my head.

Researcher: Just the concepts or...?

Cheryl: Basically, everything. I tried taking anatomy and physiology because I thought I was going to do nursing pool, and the whole bones and muscles and ligaments and I just couldn't grasp it. It was all memorizing and I'm not good at that.

Researcher: Do you have trouble with other classes where it's all memorization?

Cheryl: Not really. I think it was just too much information at once and you have so many different things going on in the sciences. I don't really have an issue memorizing dates for history. It's never a problem.

Researcher: What classes do you have the most difficulty with?

Cheryl: Any science classes. Yeah, that's where it all goes downhill.

Researcher: Anything else besides that?

Cheryl: That's really it. Actually, my government and history classes when I was taking my core, they were a little tough they weren't something I was interested in. Maybe if I had been more interested in the past, it wouldn't have been so bad, but law, government that kind of stuff just ?? particularly ??.

Researcher: Ok. So the science, you struggle with that pretty much because there is too much information for you to understand all at once.

Cheryl: Yeah, it's not interesting either. I get that Biology is the body or bones or organisms and cells and everything. I understand that chemistry is proton, neutron, electron but putting it all together that I just get so frustrated about it and everything starts spinning in my head and it doesn't make any sense.

Researcher: You can get kind of the pieces...

Cheryl: Yeah.

Researcher: But when you try to look at the big picture, it gets overwhelming.

Cheryl: Yeah. Exactly. There's just too much there.

Researcher: You said with government and history, those were difficult because you really weren't interested in them.

Cheryl: Yeah. War after war after war after battle after war, it gets really boring after a while. We're on our third battle, same war. It was awful.

## Dyslexia Difficulties

Liz and Deborah also spent considerable time discussing the difficulties they experience because of their dyslexia and the accommodations they receive for their dyslexia. Keeping up with note taking and following the professor during class was a challenge for both participants. The reading requirements in most classes were also challenging for both participants. Additionally, Deborah had difficulty getting refocused if something in class distracted her, and Liz had astigmatism, which made copying off the board and transparencies even more challenging.

Liz: It's hard for me to keep up when things go really fast because that tends to make things get more confused for me. And like trying to write everything down quickly. I'll go back and can't read my handwriting or I wrote ?? I'm trying to write fast if someone is

talking, and I'll look back through my notes and I'll have Es where Ls should be and it's just kind of jumbled up and confusing for me. Making sure the little things are all accurate. Like when I'm trying to do math sometimes I add instead of subtract and miss a small step. So just paying attention to the details to make sure it is all correct. I used to have trouble with comprehension as well. If I was reading something, I was expected to read it and answer questions about it quickly, then I had a hard time making sure I got all the pertinent information.

Researcher: Ok. What about copying off the board or trying to read overheads or PowerPoint?

Liz: That's also hard for me. I have astigmatism, so I have to sit close to the board. If the teacher is erasing the boards, like writing and erasing and writing more, making sure I get it all done. Or if looking at things on the overhead, if they change things really fast on the PowerPoint or whatever, it's hard for me to make sure I get it all down quick enough. Which was also why it was helpful to have tape recorder in class and I also had the ability to get copies of all my professor's lecture notes, which was really helpful. For a while I got the carbon copy notes, where they would take notes and I would get the other copy. And some of the professors if they had transparencies, they would give me copies of the transparencies.

...

Deborah: If they have slides, if I can get access to slides, I will be like everything is copasetic...I'm like, happiness.

Researcher: Do you look at the slides before the class or after the class?

Deborah: I look at them briefly before the class. And then I print them out. I write beside them. I'm listening to the teacher. I'm just writing what I hear and not looking because I don't need to see any of the visuals because I've already seen them before briefly. And then afterward I type everything I have written down or add it or scratch it out...especially with my Drug teacher. He'll make all his slides at the beginning of the semester but he'll add and subtract things all the time so unless you get the most up to date, two minutes before the class, it's not the same. So it keeps me always, I'm scratching and I'm writing, and if it's a point he says it a couple of times. So if I didn't hear it, I can go back. And I always have someone else in the class...I always know someone there where I'm like, can I compare my notes to you because you know I was there.

Researcher: That's cool. So you write your notes on the slide so that you don't have to watch. You don't have to look up and try to go back and forth

Deborah: Yes. Because I will get completely distracted. And people asking questions. That's one of my biggest things. I had to leave a class because a girl wouldn't stop asking. I could not learn with her in the class.

Researcher: Just kind of taking things off track?

Deborah: Yes. I can't focus. There's a guy in my Epidemiology class that I just want to throw paper wads at him because it doesn't consist of what we are trying to learn about. I need to get her point, what she is trying to get across to me, down so that when I come back to it, I can study it, rewrite it, understand it so when it comes to the test, I can pass it. But if you are asking her, talking about children and it has nothing to do...because we all know our teachers' little niches to make them go off on a tangent. And you talk about diet pills so spends 30 min on diet pills and it had nothing to do with the subject. I get very annoyed and when she comes back to the subject, I'm nowhere near as focused as I was at the beginning of the class.

Researcher: It's really hard to come back to what you were....

Deborah: to what we were doing. Because that means she has to rush to finish her lecture instead of spending the amount of time she originally had planned. That guy...and the girl who couldn't understand basic government. I'm like, you're in a senior level class you need to get out of here if you don't understand that Federal law trumps State law. She spent 20 min like, I'm from California. I'm like, I don't care. I'm from Alaska. We have similar weed laws. I understood this in 7th grade.

## Accommodations

Deborah and Liz both also discussed the accommodations they received for their learning disabilities, including those they found most helpful. Both received assistance with note taking. They both had the use of a scribe in many of their classes. Additionally, they both were entitled to copies of the professor's notes and any transparencies or PowerPoint slides that were used in the class. Both of them were allowed to record their classes. Deborah also had the ability to request that her classes be video recorded as well.

Researcher: So we've been talking a little bit about your accommodations, which accommodations have you found to be most helpful? You said the tape recorder.

Liz: The tape recorder and the copies of notes. Just making sure I have all the information I needed as quickly as everyone else seemed to be getting it. It always seemed like I was never as fast as everyone else writing notes.

...

Researcher: Do you have any other types of accommodations?

Deborah: ?? learning, time, people, writing, reporters, scribes, oh I can also have a video camera.

Researcher: For class?

Deborah: Yeah, especially if they know the teacher is a lot of drawing and diagrams because if I'm writing and they're talking I'm missing something. So I can do a video camera so that I can watch them at a later time...rewatch the whole entire lecture.

Researcher: I would have loved that.

Deborah: Yeah. But I have to show up rally early like a week before school starts to sign up for that because they go really quickly. It also depends on the professors. Sometimes they have issues with that.

### Accommodations' Effect on Grades

Both Deborah and Liz talked about how their accommodations affected their grades. In both cases, they reported tremendous increases in their grades when they started using their accommodations. Deborah received extra time on tests as well as assistance in filling in bubble sheets. In the excerpt below, she discusses why this accommodation was necessary and the effect it had on her test grades.

Deborah: I get additional time on test because I have to read the question like six or seven times. And bubbling letters are my enemy. Depending on whether I can handle it. If it's 20 questions, I'm good. If it's 50 questions, I'm good. If it's 150, I'm going to just write down the letter on the test and give it to someone else to bubble because I will mix my c's and my d's. My c's and d's and a's..no..a's I actually get right. My c's, b's, d's and e's. The d's and e's are the...it's a disaster. I didn't use my accommodations because I wanted to see how I would do without them this semester. And I didn't use it in my First Aid. My first test was a disaster because she wouldn't let us write on our test. I missed 6 questions and all 6 questions were because they were c and it was supposed to be d, and I had c bubbled...I had the right answer written down and the wrong answer bubbled. And it wasn't because I was trying to be, oh it could be this. No, I knew it was that but it didn't translate. From then on she was like, you can actually write on your test. When we are done with class, you can come read me your answers and I'll make sure your bubble sheet matches.

...

Researcher: We were talking about the difficulties associated with dyslexia that you have seen in school. How do you think those difficulties have affected your classes and grades?

Liz: I know that until I started getting accommodations, my grades really suffered particularly in math or anything that involved a lot of note taking like science in middle school and algebra. I noticed my grades drastically improved once I got my accommodations and also when I was able to start taking the online classes. I went from getting Cs and Ds in algebra to getting Bs and As.

### Coping Strategies

Deborah's fourth most prevalent theme was discussion of the coping strategies she has developed to help her cope with the difficulties her learning disabilities cause for her in school. Her copying strategies were very detailed and complex and rely heavily on help from friends and family. However, she did mention that it took her some time when she came to college to feel comfortable enough to ask for help from her new friends. Much of the help she received from fellow students was offered by those students because they knew she struggled to stay focused in class and keep up with note taking. However, she also discovered that students in college became more competitive and less likely to help her, which caused her to abandon her original plan of attending medical school.

Especially Botany. Guy was looking at trench coats in Botany. I'm like, why are you looking for trench coats? It's 90 degrees outside. I missed that whole entire lecture because he spent the whole entire class looking at trench coats. But luckily the guy beside me is a scribe for the court, and he's like, I'll email you your notes. I'm like, thank you. And he's like, and you have a recording.

...

Deborah: The beginning of science, like the first, like up to organic chem, I always had someone there who knew, like, they'd be like, ok, Deborah's not going to really understand the reading. So they're like, this is what we're going to do. I just, cause I'm friendly, they're like this is what we're going to do so you can understand this so we can both pass this lab practicum. So...

Researcher: So you basically had buddies in high school that would help you out?

Deborah: Yeah. I even made some in college.

Researcher: Ok.

Deborah: Once you get to organic chemistry, everybody gets cutthroat. And so, and also when you get to biochemistry.

Researcher: And that's when you changed? When you got to orgo chem and bio chem?

Deborah: Yeah.

Deborah also relied heavily on family and friends to help her with her writing. She had a system in which she would write a rough draft and then send it to her aunt and her father for editing and correcting. She later developed a friendship with a person who was studying to be an English teacher, who willingly took up the editing and revising duties.

Deborah: I email it my aunt in Arkansas. She'll do the comment review section and ask me what was I doing here so I can see it because I don't see it because I wrote it. And when I'm done making corrections, I'll email it to my father and he'll have to go through and say Ok. I need more than just, you need to capitalize that A and switch that around.

Researcher: So your aunt gets to basically play your editor.

Deborah: Yes. My aunt and my dad.

...

Deborah: I've made friends who actually know what they're dealing with who will look over it, correct it as I'm doing something else and then press on.

Researcher: So you've got friends who can help you with...

Deborah: Yeah.

Researcher: And can get you through.

Deborah: It took me a while to let them in. They were like, let me edit your paper...I was like, no...It's between me and my teacher. It's completely embarrassing. And then one of them actually looked at it, and she was like, what the hell? I'm like, yeah, you weren't supposed to read that. She was like, no wonder. She just sat there and corrected everything. My closest friend is an English major, so this right here...I'm like her ultimate challenge. She's like, I want to see your paper. I feel like correcting everything. I take classes in the summer and she doesn't. So she'll go over to my paper and just like... And I'm like, you are ridiculous. I don't understand how you like this. I don't know.

## Classes Inappropriate for Second Life Course Design

Rachel's fourth most prevalent theme was her opinions about the types of classes that would be inappropriate for the course design in Second Life.

The ones least likely to lend themselves to this environment would be higher level math courses where typing out the problems/answers becomes problematic, and upper level chemistry or biology courses because the lab work is not something that can easily be performed at home. Language classes that involve an alphabet that varies from English by more than a handful of letters such as Russian, Japanese, Chinese, or Arabic would have an enormous barrier to keyboard use. Phonetics courses would also be difficult due to the learning curve for locating all of the symbols and diacritic marks needed for such coursework on a keyboard.

## Interpersonal Interactions

Billy's most prevalent theme was discussion about interpersonal interactions and how they factor into his personal learning strategies. Billy's preferences for classes appear to be strongly related to the amount of interpersonal interaction present in them. He states that his least favorite classes and those that he struggles with the most are straight lecture classes, regardless of the subject.

Researcher: What kinds of classes do you like the least? I know you like lab classes the most.

Billy: Straight lectures.

Researcher: Does the subject matter?

Billy: It has an impact but mostly if it's just straight lecturing then I will end up not paying attention. If the professors are more involved with the students and posing interesting questions or having students challenging them more, like Dr. Traum did, then I would be more interested but still fade out a lot.



Researcher: So interaction between professor and students helps but,

Billy: Very much

Researcher: doesn't negate more, if it's too much lecture.

Billy: And I found that in my thermodynamics II class with Dr. Traum, he'd ask or he'd lecture and then ask the students some questions or ask their opinion on something. And then I always had the one little opinion or question that he couldn't answer and poked holes in almost anything that he had. It was quite fun.

Researcher: Yea, that was fun.

Billy: So in just a sentence or so I could derail him from lecturing for 20 to 30 minutes.

Researcher: So basically you don't like lecture classes because they're really hard for you to stay focused on. You prefer that interaction and something to challenge you. Do you think lectures are just kind of, they're not very challenging. You don't really have to think very much about them.

Billy: There's not much thinking involved but sitting there and listening. Especially when they're just giving it right out the book. I can go and have the book and read it out of it.

Researcher: What classes do you have the most difficulty with?

Billy: The lecture classes.

Researcher: And, again, it doesn't matter what subject matter it is?

Billy: It matters somewhat but not enough to negate the lectureness of it.

## Favorite Games and Game Strategies

Billy and Jack were both avid gamers. One of the most prevalent themes in both of their responses was discussion of their favorite games. Both enjoyed playing games where they had a lot of control over how their characters developed throughout the game. Jack preferred massively multiplayer online games(MMO), such as EVE online and Word of Warcraft (WoW).

Jack: Almost universally, any game I like has to have the ability to build up your character in power. Like in any MMO, you get leveled. I actually really enjoy the leveling process....But I also enjoy the various plays and the back levels. I experienced the top level of competence, when it was brand new, for almost every competence in

WoW (World of Warcraft) except ?? but other than that I've done every competence at release or near release.

Billy preferred a combination of role playing games (RPG), first person shooters (FPS) and simulations. In the following excerpts, he discussed why he likes these kinds of games.

Researcher: Why are they your favorites? What do you like about them?

Billy: First person shooters on PCs, most of this is all on PC and not console, PCs because I'm good at them. I've been playing first person shooters on the PC since I was 11, 10 something like that, maybe a bit younger. And guess I'm good at them. It gives a nice adrenaline high I guess with the intensity of the action and depending on the shooter the strategy involved.

Researcher: What about your RPGs?

Billy: RPGs? It actually depends on the type of RPG because a lot of them are a mixture of first person shooter and RPT and then there's crossover between my enjoyment in them. But RPT is building somebody up which I have envisioned.

Researcher: So being able to basically imagine this character and then create it.

Billy: And then seeing it succeed or fail.

Jack's second most prevalent theme was his discussion of the strategies he uses when he plays video games and online games.

Jack: Almost universally, any game I like, has to have the ability to build up your character in power. Like in any MMO, you get leveled. I actually really enjoy the leveling process. But I also enjoy the various plays and the back levels. I experienced the top level of competence, when it was brand new, for almost every competence in WoW except ?? but other than that I've done every competence at release or near release.

Researcher: Ok. So you're an early adopter of those new packs when they drop, right?

Jack: Yes. And when they release new expansions.

Researcher: What is your usual strategy when you are playing these games?

Jack: You're going to have to clarify that question.

Researcher: Ok, do you do more of a straight, linear path, just straight through the plot? Do you do more of an exploratory thing where you explore the environment? Do you do the side quests? That kind of thing.

Jack: For MMOs, I look at what I get out of the frontline. If I'm running a quest for money or experience or whatever, I tend to look up how do I get this thing and do whatever I have to do.

Researcher: So very goal oriented there, right?

Jack: For other systems, like single player games, I tend to be much more what's over here? But even then, often times, I'll take a guide to find out if there are any super hidden secrets that you have to find to get.... Although in RPGs that have an alignment and morality system, I tend to have a particular way I play. I consider myself a neutral evil character aligned with good, if you are familiar with the D&D system.

Researcher: I am.

Jack: I tend to play characters that are like, I could just murder you if you were getting in the way of accomplishing the objective, but I never go with the like Haha! Now I ??

Jack: Ok, well, Dragon?? is a lot of character building. It's like, ok, we need the cure for this disease or our country will be thrown into civil war. The guy has the cure but he wants us to go fetch something. So we go out and fetch it and bring it back. Then he wants something else and it's like you know what, f\*\*\*\* this guy. I just kill him and take it. I was nice the first time, now I'm not.

### Classes in Which Participants Excel

Nathan's fourth most prevalent theme was his discussion of the classes in which he excels. In high school, he excelled in math, but when he came to college his interests shifted. In college, he excelled in classes in the soft sciences, specifically sociology.

Researcher: So you used to be really good at math, what made the change to...?

Nathan: I really have no idea. As soon as I got to college a switch turned off, because I can't do math for the life of me anymore. I don't know if it just got harder or I had a lack of interest in it and since I had a lack of interest in it I didn't care to do well, 'cause I know for example I'm a A student but if I have a class I'm not interested in I'm not going to do well in it and at UNT I just need a 60 to get a passing grade in math and that's all so I would go to class as little as possible and just take the tests skip the homework and just get a 60, so I think that's what it is... is that I stopped caring about the subject and that made me stop learning the material and not want to do it.

...

Researcher: What kind of classes do you like the most?

Nathan: You mean, subject wise?

Researcher: Subject or approach, either way.

Nathan: Approach wise, I like on-line classes. The reason for that is that I kind of prefer to take responsibility. I prefer to have my work done and know what I'm supposed to be reading and rather have more reading than have to take lecture or something that I'd have to go to so I learn better through distance learning... and then subject wise, I like soft sciences. It's what I'm interested in. My major is sociology and my Master's is going to be in theology, so, yeah. That's the kind of classes I'm interested in. ...In Sociology, I really like the study of collective behavior. That to me is really interesting. In Theology, probably something like Biblical Hermeneutics. To me that's really interesting as well.... To be honest it's because I got into Sociology for just weird reasons. Because my plan was to go to a graduate school to get a Master's degree in Christian Theology, so I wanted to go to a public school and something that was normal and learn about problems in society from a secular standpoint. That's why I like Sociology. Because I don't... I mean... I guess you could say one of the basic themes is the problem with the world is society and how society molds people and so if I don't agree with that it's interesting to learn about. I would like to be informed about something even if I don't agree with it. So, it's the exact opposite of Theology. I don't take my faith blindly and so I am someone who prefers to have an educated opinion on something.

### Observations

As each participant explored the course in Second Life, their activities were recorded, with their consent and prior knowledge. Sessions ranged from 15 minutes to an hour in length, with the average length being approximately 45 minutes. I reviewed these and coded them using the same coding schemes as those used for the interviews. As with the interviews, the top four activities each participant spent time doing in the course were recorded and color coded to make themes across all participants more apparent.

Interacting with course materials was in the top four activities for all participants except one. Irene had significant issues with the mechanics of Second Life, which strongly influenced her activities in the course. Of the rest of the participants, reviewing course materials was in the top two course activities for all but one participant. Deborah was the first participant to review the course design, and I neglected to delineate the boundaries of the course design prior to the

observation session. Consequently, she spent significant time exploring other parts of the island that were not related to the study.

Seven of the eight participants spent significant time interacting with elements in the environment and exploring the various objects in the course. They “touched” many of the interactive items including the chairs and “pose balls” which are objects that are scripted to cause avatars to perform a certain action. In the course, some of the pose balls caused the avatars to sit while others caused them to float in mid air. Additionally, there was a hammock on which the participants could nap. The majority of the participants did interact with hammock even though it had nothing to do with the course materials. It was placed in the environment solely to encourage participants to interact with objects in the environment. Interaction with these objects was not required for the course objectives or to access the course materials. Participants chose to explore and interact with these elements on their own.

Liz the one participant who did not significantly interact with elements and objects experienced a computer malfunction during the observation. Unfortunately, it took quite some time to recover the computer, which limited the amount of time Liz had to complete her exploration of the course design. Additionally, the recording of her observation session was damaged, so only her activities prior to the computer failure were recorded. She had only explored the group meeting area prior to the failure. However, she still spent significant time reviewing course materials.

Another activity that was prevalent across five of the eight participants was exploration of the various course areas. The course materials could be accessed from anywhere in the course, so it was not necessary to explore the different areas. Two of the participants, Jack and Billy, chose to review the entire course from one course area rather than moving to the different areas.

However, the rest of the participants chose to move around and explore all of the different course areas, including the central tree where the course materials were centered, the group meeting area, the professor's office area, and the two private study sky boxes.

Viewing the various videos in the course was an activity that five of the participants spent significant time doing in the course. All eight participants chose to view the entire intro video, which included a brief tutorial about moving around the course and interacting with the Second Life environment. Five participants also spent significant time viewing the other videos in the course, though Deborah skipped parts of some of the videos. Billy viewed the videos in the discussion area, but he also interacted with the environment and other course materials at the same time.

Three participants did experience significant technical problems, which did influence their experiences in the course design. Irene struggled the most with both technical problems and the Second Life environment as a whole. She had difficulties walking, moving, manipulating objects and viewing course materials on some of the view screens in the course. Billy and Liz also had issues with web pages not loading correctly and files and videos not opening properly.

### Summary

This chapter has presented the survey data for all participants as a whole as well as the findings for the study sample population. Included in the qualitative findings were data from the interviews and the recorded observations for the eight participants in the purposeful sample. In the following chapter, the significance of these findings will be explained.

## CHAPTER 5

### CONCLUSIONS AND IMPLICATIONS

The purpose of the study was to understand if the design modifications used in the course design in combination with the unique elements available in a virtual environment minimized the difficulties students with dyslexia enrolled in higher education often experience in online classes. In tandem with this research question, the study also sought to examine if the design modifications were beneficial to students without dyslexia. The study also sought to explore if participants' online activities, experience with playing video games, previous experiences with online classes, or previous learning history including where they attended school and their preferences as learners influenced their experiences or perceptions of the course design presented in the study. The following chapter discusses what the data collected from the survey, interviews, and observation sessions revealed. This chapter focuses on the conclusions and implications learned from the study. This chapter ends with suggestions for expansion of the study and further research.

The purposeful sample consisted of eight participants including three participants with dyslexia and five participants without dyslexia. The participants in the sample are briefly reviewed below so they can be more easily identified in the following sections. For more detailed descriptions of participants, see Chapter 4 Results (Purposeful Sample) Section.

#### Review of Participants

##### Deborah

Deborah was a 23 year old Black female General Studies Senior. She identified as having several learning disabilities including dyslexia. She had very limited experience with online

classes and no prior experience with Second Life. Deborah was an avid video game player but only when she was not taking classes.

### Billy

Billy was a 25 year old White male Mechanical Engineering Technology Junior who identified with numerous learning disabilities including dyslexia. He had very limited prior experience with Second Life and no prior experience with online classes, though he had taken some web enhanced classes (classes that meet regularly face-to-face but utilize online resources for some class elements). Billy was an extremely experienced and avid video game player and spent considerable time playing video games at the time of the study.

### Liz

Liz was a 29 year old White female Human Development Junior. She identified as having dyslexia. She had no experience with Second Life prior to the study. She had extensive experience with online classes. Liz had extensive experience playing video games and regularly played them at the time of the study.

### Cheryl

Cheryl was a 25 year old White female Sociology Junior. She did not identify as having any learning disabilities. She had fairly extensive prior knowledge of Second Life and very extensive experience with online classes. Cheryl had very limited experience playing video games and did not play video games at all at the time of the study.



### Nathan

Nathan was a 19 year old White male Sociology Senior. He did not identify as having any learning disabilities. He had no prior experience with Second Life, but he had extensive experience with online classes. Nathan had no experience playing video games and did not play games at all at the time of the study.

### Irene

Irene was a 21 year old Hispanic female Spanish Senior. She did not identify as having any learning disabilities. She had very limited experience with Second Life prior to the study. Additionally, she had limited experience with online classes. Irene had limited experience with video games and played them rarely at the time of the study.

### Jack

Jack was a 26 year old White male Business Computer Information Systems Graduate student. He did not identify as having any learning disabilities. He had no prior knowledge of Second Life and very limited experience with online classes. Jack was an extremely experienced and avid video game player and spent considerable time playing video games at the time of the study.

### Rachel

Rachel was a 35 year old White female Pre-Pharmacy Graduate student. She did not identify as having any learning disabilities. She had limited experience with Second Life prior to the study. She had extensive experience with online classes, but her experience was primarily

with professional continuing education classes. Rachel had extensive experience playing video games, and she played them regularly at the time of the study.

### Emergent Themes

Over the course of the online survey, interviews, and observations several major themes emerged from the research. These included Interaction/Engagement, Student Control of Learning, Online Activity/Video Game Experience Assumptions vs. Reality, and Technical Problems/Second Life Mechanics. Interaction/Engagement includes interaction with the course environment, interactions between students including social learning opportunities, student/instructor interactions, and hands on learning and practice opportunities afforded by objects and simulations in the Second Life environment. Student Control of Learning includes student control, or lack thereof, over course pace and course materials and, issues with time and learning management. Online Activity/Online Course/Video Game Experiences includes data the study revealed that were contrary to assumptions about students in the 19-25 year old range regarding their online activities and affinity for playing video games. Additionally, this theme includes the effects participants' reported experiences affected their experiences in the Second Life course. Technical Issues/ Second Life Mechanics includes difficulties participants experienced in the Second Life environment. In the sections below, these themes are more thoroughly explained and their implications for educational technology and online course design are discussed.

#### Interaction/Engagement

Results of the surveys and interviews provided considerable feedback about

interaction/engagement, or lack thereof, in participants' previous classes, both face-to-face and online. Interaction and engagement were very important to many participants, often determining the participant's level of enjoyment and achievement in a class even more than the subject matter of the class. Additionally, those interviewed discussed their impressions of the interaction and engagement potential of the course design in Second Life and the Second Life environment in general. Review of the observation recordings also revealed that the sample population spent the majority of their time in the course interacting with the course materials and other elements of the environment. Each of these elements is discussed more thoroughly below.

All participants reported dissatisfaction about the lack of interaction/engagement, or their ability to actively interact with course materials and other students and willingness to engage actively in the learning process, in typical face-to-face lecture based classes. Through the survey and interviews, both participants with and without dyslexia reported they had difficulty staying engaged and understanding the material presented in these types of classes. One participant not in the sample population reported the following on the online survey, "When in class, I have a lot of trouble taking in what the teacher is saying and then understanding it later. I do most of my learning out of class. The only reason that I go to class is for the attendance points." As Billy put it, "you don't have to think very hard to sit and listen to a lecture." He expounds further in his comments below.

Researcher: What kinds of classes do you like the least? I know you like lab classes the most.

Billy: Straight lectures.

Researcher: Does the subject matter?

Billy: It has an impact but mostly if it's just straight lecturing then I will end up not paying attention. If the professors are more involved with the students and posing interesting questions or having students challenging them more, like Dr. Traum did, then I would be more interested but still fade out a lot.

Researcher: So interaction between professor and students helps but,

Billy: Very much

Researcher: doesn't negate more, if it's too much lecture.

Conversely, participants universally reported being more engaged in both face-to-face and online classes and understanding the material more readily if they were given opportunities to actively participate in the class through hands on practice or interactive classroom activities or discussions. However, most of the participants in both the population and the sample population reported having experienced very few classes with these types of interactive or hands on activities except in lab classes. For example, Billy and Jack were both unaware of any other types of classes beyond lecture-based classes, lab classes, and standard online classes in Blackboard or other online learning management systems.

In order to gather information about their previous experiences in school and their preferences as learners, participants in the sample population were asked to talk about their favorite and least favorite classes. Additionally, the eight participants in the sample population were asked to discuss the classes in which they excelled and those in which they struggled. Most participants in the sample reported their favorite classes changed when they began college, mostly due to changing interests. However, in Deborah's and Liz's cases, their favorite classes changed because of the way the subjects were taught in higher education, specifically the level of engagement and hands on practice opportunities in the classes. Prior to college, Deborah reported that science classes were her favorite and the ones in which she excelled most. In her high school experience, science classes were taught with a very hands-on approach with lots of opportunities for hands on practice. However, her science classes in college were more lecture and reading based and much less lab based. Additionally, in high school, other students were willing to help her understand the material, but in college, she reported, the students were much

more competitive or “cut-throat” and were much less willing to help her. Consequently, she abandoned her plans to pursue a career in medicine.

Interaction and engagement was also a big component of the sample population’s experiences in the Second Life course design. The majority of the participants in the sample reported they liked the design and would be interested in taking a longer course. Rachel had this to say about the course design.

Researcher: What did you like about the course?

Rachel: Just the fact that there were a lot of different ways to get through the materials. I mean, you could open up just one thing right at the beginning there and just keep going through all the material if you wanted without ever touching another thing in the environment. Where's the fun in that? Got to go play with things! Or you could break it up into smaller, bite sized pieces that are easier to digest.

The two participants who did not like the course were Billy and Jack. They both felt the course design was nothing more than a course on a web page and would prefer to simply read the materials off the website.

Billy: Uh, most of the course materials seemed to accessible through the first website that you get to from anything, so moving around in the actual Second Life area seems unnecessary....Probably I'd take just like an online website course, like anything else, since all the information was on the website....and actual class in Second Life, and not a class on a website that you get to through Second Life.

...

Jack: Not that I was ever a real fan of the Blackboard, but it doesn't seem like the Second Life type format offers a particular advantage over just a website with all your information accessible.

Researcher: So the environment's of no use to you?

Jack: Yeah, well, it's entirely cosmetic environment. So, yeah, it's just like having to walk around the website basically.

Jack did not like the way the course materials were presented in the garden. He did not like that the topics were split into separate areas, preferring everything be presented on one

screen together.

Jack: The way the course is laid out I didn't necessarily like. I should say, I guess I would prefer a more centralized screen that I could just go, press this. Access what you want from a course menu of all the contents. Rather than ok, I have to walk across and teleport up to the Zen garden to find what I was looking for.

Researcher: So you didn't find any of the materials around the tree in the center of the garden?

Jack: Oh, I did. It's just like, I would prefer all the materials to be in one place. And it seemed like all of the screens had different information on them.

Researcher: They did, but you could get to all the materials from all the screens.

Jack: Oh, I didn't mess around inside the website. I just clicked on the screens and opened up the page.

In further questioning, they both reported that if they had been able to interact more with the environment or if the course materials had been more tightly integrated into the environment, they would have been more interested in the course.

Billy also mentioned in his initial follow up interview that he would possibly be more motivated to log into the course if it were in Second Life as opposed to a more traditional online course. However, he also felt the ability to explore the environment would be too distracting for him. He felt he might be more inclined to stay focused in the class if the design were contained inside a building and his avatar's mobility were restricted so that he could not leave the building.

Researcher: What did you dislike about the course?

Billy: Second Life as an engine. Or at least not being able to modify the controls.

Researcher: Anything else?

Billy: The fact that I could just, in Second Life, get up and fly away to anywhere else in the world, at any time. (laugh)

Researcher: Ok. And that's something you didn't like about it?

Billy: Yeah. And I could very easily just wander off. A classroom or learning environment needs to be somewhat more constrained in order to not be distracting. Back on the previous question, flying would be a distraction.

Researcher: Uh, would it have been less distracting if it had been like inside a building?

Billy: Possibly.

None of the other participants expressed this sentiment. Interestingly, Billy had never taken an online class and had no desire to take one, but he was open to the idea of trying a class in Second Life.

Though Jack did not feel the course design met his needs, he showed avid interest in discussing other courses that he felt would be more appropriate in the design, which primarily included computer scripting classes or design classes. The primary element in his recommendations was the opportunities for interaction and hands on practice possible in the Second Life environment.

Researcher: Would there be another course that would be more interesting to you in that environment?

Jack: I'm sure there would be several. You could do like a scripting class. That would probably be pretty interesting, since I understand Second Life has its own scripting engine.

Researcher: It does.

Jack: And so, if I go (unintelligible on recording) teach like comfortable with scripting. That would be a pretty basic...and you can literally experiment in the game engine with the scripts.

Researcher: Ok, any other types of classes that you think would be good here?

Jack: I can see how any like kind of like art design or visual design would be good. I think math courses would probably do poorly in the environment, and any class that I think is more like a discussion based class isn't really going to go that well because I think people discuss better by voice.

Researcher: You can do voice in this.

Jack: Oh, then that might work fine.

...

Researcher: So let's think back about the course design. ...What kinds of classes do you think would work in the design you saw when you were in the lab the other day?

Jack: Well, like I said, any kind of scripting class. Anything that basically makes use of the Second Life environment in a way that you could do...

Deborah stated she would be interested in taking a class in the course design, even though she had no desire to take online courses in more traditional designs. She felt the environment was more interactive and the materials were presented in manageable chunks. Additionally, she stated she felt motivated to explore the course and the materials more actively. At the end of her first follow up interview, she had this to say about the course, "If communication, negotiation were a major interest, I would totally be playing that all the time."

Liz and Cheryl both stated they would be interested in taking a longer course in the design as well. Both of these participants had extensive experience with online classes prior to the study.

Researcher: Do you think you would like to take a longer class with that format? Like a live class?

Liz: Yeah. I think the more experience I have, too, the easier it would be to navigate. ...Yeah, seems like a fun way to learn, kind of mixing video games with classroom activity.

Cheryl felt the visual design of the course in Second Life was much easier to navigate, and she reported it was much easier to find materials and activities in the course than her previous courses in Blackboard because she could actually see all of the course materials from almost anywhere in the course.

Researcher: Ok, what was your overall thought about the design of the course?

Cheryl: I liked it. It's very, it's very easy to navigate. ...It was all right there. I liked the little foursquare style in the middle. I could just keep walking around it. It was in one central place. You don't have to...I didn't have to run all over the place, didn't have to, to find everything. It's all very easy.

Researcher: That was kind of the idea but we weren't sure it was going to work.

Cheryl: Yeah, it worked great for me. I looked at it first, and zoomed out a little bit and saw that it was four little boxes. And I clicked on it and it brought me into the next thing. And it was nice to be able to navigate through the page online, too. If I wanted that option, if I didn't want to go to the next spot in Second Life, if I just wanted to go through the left side panel, the links on there, I could do that as well. I liked that option.



...

Cheryl: I think that most classes, they use the same thing online, the same outline, the same course structure. It's just so easy, it's so easy to navigate that any course can adapt to it and any course can use it. And I think that online classes, you have a tendency to not want to look at your online class, but when you have people you can actually do group work and communicate and IM with them right there. I think it would be easy for all classes to work that way.

Researcher: You like the interactivity.

Cheryl: Yeah, that was the key thing for me. It was so easy to type an IM and go. And the information was all there. It was kind of fun as long as you didn't jump to another dimension.

Researcher: So fun, everything was there, are you talking about visually, you could see what you were looking for?

Cheryl: Yeah, on the right side of the screen is your quiz for that module or lesson and your instructor is right on the other side of the yard from you. You can see them. You don't have to go searching. A lot of times, I'll log on to an online class and have to spend five minutes just searching for a syllabus and how grades are set up. And with Second Life, you know just to go back to the beginning of the yard because that's where the introduction is. It's all right there.

Liz and Rachel also talked about how easy it was for them to find course elements

because they could visually see them in the environment. They did not have to click on multiple

levels of links to find the course elements as was the case with their previous online classes.

Researcher: What was your overall thought about the design of the course?

Liz: I thought it was pretty well laid out. I liked how the tabs and everything made it easy to follow.

Researcher: Ok. The tabs on the course site or....what are you talking about?

Liz: Yeah, how it was organized on the site, you could click through everything pretty easily from beginning to end on the lectures and then also how everything was arranged for the course with the calendars and the discussion and everything. It was easy to find everything.

...

Researcher: What about the overall layout?

Liz: I liked it. It was pretty easy to find everything. Most of it was in the center and what wasn't was in the four corners, so it was neatly laid out.

Researcher: What about the organization of the course...the materials and things?

Liz: The materials and things? I liked it. Like I said, I think it was really easy to find things because of the way you had it tabbed and laid out.

...

Researcher: What about the layout or the organization of the class? Any problems with either of those things?

Rachel: No, I just found myself, because I explored it fairly thoroughly, I found myself just constantly coming back to this and pulling something up and going, oh, I've already done that, so let's move on. But other than that, no, it seems pretty easy to follow. I mean, everything...all the central stuff that you need being just circled around that one tree seems to keep it all together. Having the Review screen between you and your end goal is probably a useful thing.

Cheryl also mentioned that the visual and interactive elements of the Second Life environment would motivate her to spend more time in the course than in her previous online courses. She reported “dreading” logging into her previous courses, but she felt she would actually enjoy spending time in the course and interacting with the course materials in Second Life.

Interaction/engagement is very important to the participants in both the whole population and those in the sample population. In their survey and interview responses, this is one of the key points they return to in discussing what they like most and least about their previous classes, both online and face-to-face. Additionally, interaction is one of the main elements the sample participants found desirable in the Second Life environment.

### Student Control of Learning

Another important theme that emerged from the online surveys and interviews was a focus on student control of learning. Student control of learning is an important element in Powell's Key Learning Needs of Dyslexic Students (Powell, 2003), Constructivist Learning Design (Collay & Gagnon, 2006), and Gagné and Briggs (1995) Events of Instruction. (see Chapter Two for detailed discussions of each of these design models). Respondents to the survey were asked to report the difficulties they typically experienced in both face-to-face and online classes. Forty percent reported that they had experienced different difficulties in their online

classes than in their face-to-face classes. Difficulty understanding the course materials and managing their own learning were the top issues reported by survey respondents, regardless of whether they had dyslexia, suggesting that students without dyslexia also experience these difficulties in online classes. A common element in the difficulties that were reported in the survey was either a perceived lack of control of their learning or difficulty managing their learning.

Reading difficulties and time management were reported by participants with and without dyslexia, suggesting that students without dyslexia also struggle with required course readings and managing their time effectively. As with the whole population, both participants with and without dyslexia in the sample population reported having difficulty with time management and reading difficulties in their face-to-face classes, again suggesting that these difficulties are not limited to students with dyslexia.

In addition to their survey responses, sample participants also discussed both of these difficulties in their interview responses. In online classes, participants reported having difficulty with the amount of reading required in most online class though the participants with dyslexia reported this difficulty was more disruptive to them. Billy and Deborah, two of the three participants with dyslexia, reported avoiding online classes entirely because of the reading requirements in them. Billy had never taken an entirely online class and had no plans to do so.

Deborah had attempted to take classes online in the past with disastrous results. She was unable to successfully complete previous attempts because she was unable to manage the reading requirements. She had no plans to attempt further online classes.

Researcher: Have you taken any classes online?

Deborah: Since I've had my disability, I've only taken that one hybrid class. I've taken classes before I got diagnosed and it was horrible. I wanted to cry. I did one on the Angel network and I lasted two weeks.

Researcher: Where was that?

Deborah: That was at NTTC. They still use the Angel network and then I took one at UNT. The amount of reading because there are very few videos in the online classes is the part that gets me because I will have to read it and read it ?? a lot of times. If I have to read it several times, I need more time.

Researcher: A lot of things are timed and that's typical in online classes.

Deborah: especially when you have 30 min to finish...what normally takes people 10 min takes me like 30 min.

Researcher: And then lots of reading for one class.

Deborah: Yes.

Researcher: And you said you haven't taken anything but that one hybrid since you were diagnosed and had your accommodations?

Deborah: Yeah. And the only reason I lucked out with the hybrid is cause it was a disability class, so with my disabilities she made certain accommodations for those online, on Blackboard for our disabilities, particularly...my friends had an hour and I had two hours to get this done.

Researcher: She worked to make sure she had different things. You can do that in Blackboard but a lot of professors don't know that they can, don't know how to do it.

Deborah: Yeah. She would actually sit there and mine would say Test Alternate and stuff like that. And my papers, instead of turning it in to turnitin.com, because she knows it's going to butcher my paper, is to send it straight through Blackboard or email is straight to her. Because she knows I'm not copyrighting it.

Researcher: She knew you weren't plagiarizing it.

Interestingly, Liz, the third participant with dyslexia, actually preferred online classes to face-to-face classes because they gave her the ability to review the material as often as she liked as quickly or slowly as she wished.

Liz: I like that I can learn at my own speed and that I can reread materials as necessary and relisten to lectures, so that I can be sure my notes are right, the next time to just kind of understand all the information.

Researcher: So you can review the materials as much as you want at whatever pace you need to understand.

Liz: Yes.

Liz's experience with online learning was more positive. Prior to college, she struggled greatly with math classes, often unable to succeed in them. She began her higher education experience at a community college that used an online math curriculum paired with opportunities to ask questions of a professor during face-to-face lab hours. Her math grades immediately improved with this approach, from C's and D's to A's and B's. Liz reported that, while math had been her most challenging and least favorite class in high school, it became her favorite in college. Liz credits this change to the control she had over her learning because of the computer based curriculum as she was able to spend as much or as little time as she needed on each concept, repeating the material as many time as necessary to understand it.

*Liz:* And finding the computer classes for math was really helpful. Taking it from a textbook is really hard for me. I have a hard time understanding a lot of what was going on just reading it in a textbook, but when I had it in a computer course and I could interact with it, and I could also ask my professor questions and do it kind at my own pace and review the information until I understood it, that was really helpful.

#### Online Activity/Online Course/Video Game Experiences

A concern with adopting educational technologies is the learning curve required for students to learn how to use the technology. If the curve is too steep, meaning the technology is difficult to learn to use, students spend too much time and effort struggling with the technology, which can negatively impact their learning. The Second Life environment is regarded as difficult to learn by some users and easy to learn by others. In an effort to determine the effects, if any, of participants' prior experiences with online activities, online courses, and video games on their experiences in the course design, the online survey and the interview contained several question sets about these topics. The sections below present each topic in detail.

### *Online Activity/Online Courses*

Participants were asked to estimate how much time they spent each week online for three different categories of activities: work related, school or class related, non-work/non-school related. The majority of participants (72% of whole population) reported spending 1-10 hours per week on non-work, non-class online activities, including Facebook, games, email, surfing, watching videos, etc. Individual reports of personal activities could be distorted by self-perception of participants, especially given the most commonly reported online activities were surfing the web (85%), social networking (80%), and watching TV shows or movies (41%) or videos (38%). Additionally, the majority of respondents reported spending 1-10 hours per week online for work and 1-10 hours per week online for class, even those that were currently enrolled in an online class during the study.

In terms of amount of time spent weekly for online activities, the sample population reported spending slightly more time on non-work, non-school related activities than the population as a whole. Additionally, the sample population spent slightly more time on social networking than the population as a whole, though they spent the same amount of time for work and school related activities. See Chapter 4 Online Activities Section for more detail. Time spent on online activities and types of activities participants engaged in online appeared to have no impact on their experiences in the course, as evidenced by the interview responses and the observation recordings of the sample population. The amount of time they reported spending weekly on work, school, and other online activities was in line with the responses of the larger study population, as reported on the online survey. Additionally, their other online activities were similar to those of the larger population, though the sample population participants reported spending slightly more time on social networking than the larger study population.

Prior experience with online classes did not appear to directly affect the participants' experiences in the course, as seen in the interview responses from the follow up interviews and the observation recordings. However, prior online class experience could have mitigated lack of video game experience as two of the participants with little or no video game experience had extensive experience with online classes prior to the study. Conversely, extensive video game experience could have mitigated lack of experience with online classes. Billy, the one participant who had not taken any fully online classes, had extensive gaming experience, as reported in both his survey responses and his interview responses.

### *Video Game Experience*

Another interesting finding that was revealed by the online survey was the number of participants who report they do not play video games at all. Even though most of the participants were 19 to 25 years old, 43% of them reported they do not play video games or online games, including Facebook games, and 88% reported they play video and online games infrequently. See Chapter 4 Online activities section for more detail. One of the eight participants included in the sample population reported in the follow up interview that he had not played video games since he was a young child. Another of the participants in the sample population reported in her follow up interview that she only played one game, and she played that game infrequently. This challenges an assumption held by some (Gee, 2003; Prensky, 2001) that all students in this age range enjoy and spend a large amount of time playing video games.

Experience with video games did not appear to significantly impact participants' activities or time spent in course, though the two participants with extensive gaming experience had slightly more difficulty adjusting to the differences in Second Life mechanics as they are

different from many game controls. However, those with more experience with games did adapt to Second Life slightly faster than those with limited experience, especially games with more immersive environments and complicated plots and game play.

#### Technical Problems/Second Life Mechanics

One of the biggest concerns from educators considering using Second Life in their classes is the fairly steep learning curve required to become comfortable with the environment. In much of the research studying the use of Second Life in education, students' struggles with the mechanics of the environment was a major factor in the study outcomes. (See Chapter 2 for more information about these studies). The mechanics and user interface of the Second Life environment did prove challenging to all of the participants in the sub-population. Most of them were able to quickly overcome their difficulties with the environment. However, one participant, Irene, was unable to adapt to the Second Life environment. Additionally, all participants in the sample population experienced technical issues while in the course, which is another major concern for educators about adopting technologies such as virtual environments like Second Life.

Even though she struggled extensively with the mechanics of the environment (moving, interacting with elements and objects, interacting with other avatars, etc.), Irene was very excited about other classes she felt would be appropriate for the design and the Second Life environment.

Researcher: Ok, thinking about the course that you looked at the other day in Second Life. I know you had a lot of trouble with the mechanics and the environment and just trying to figure out how to move in there. If you can imagine not having those troubles and just being able to work in the environment, what kinds of classes do you think would work in the environment with that design?

Irene: Not math. History would be perfect because if you had an environment in which...I'm learning about India or I'm learning about New Zealand, I can just transform and be there. Wouldn't that be cool? Or Paris. You can go all over and visit the Fountains of ?? That would be awesome. History, yeah. Wouldn't it be cool if you could just touch



the fountains and you'd have the history all about it. And you would have the visual aid of seeing that and you would have a sense of direction of where are they. They are facing the museum of whatever or the Cathedral of St. Paul is right beside it.

Researcher: That would be awesome. What else besides history?

Irene: Science would work, too. If you can touch an animal or families walking around, and you walk around and say your son has your nose. And you can say the reason my son has my nose is...

Researcher: Genetics.

Irene: Yeah. Even language would work, I think. Like the history theme going on, if you are transported to a certain country in, say, the grocery store. You can interact with another avatar and say I want some ham. Pretty cool? Yeah, and it can give you a sense of something being real. Rather than just writing I want ham, I want ham, I want ham...that would be pretty boring.

And also if the avatar talks. Do you think it could work where the student can talk and they can hear you?

Researcher: It already can do that.

Irene: Oh! You see, there you have it. You have a million bucks in your hand! You can create this!

Researcher: Actually, it is being used for speech classes...not speech...foreign language classes. What some universities are doing is they are actually partnering with...some schools have sister schools in other countries, and they will partner with those sister schools in that other country. The students in that country are trying to practice English and the students in this country are trying to practice whatever other language it is and they will practice together.

Irene: That is wonderful. I think, because I have also taught foreign language, and the students are bored to death when I'm telling them, No. It's are not is. And when I'm teaching another language, and it's hard on them and they don't want to do their homework. They waste their money. But if they had something visual to look at and part of that culture. Like if you are learning Spanish, travel to Spain, maybe an environment that represents Spain and you being able to talk to someone else. And you don't have to travel to Spain, which would also be good, but you get my idea.

Researcher: Yes. The only challenge with those classes is the time zone differences and trying to find a time when both student bodies can be online at the same time.

Irene: But even within those classes, though, you can still have students within one class here in the United States, the teacher maybe monitoring and seeing where each one of them goes. One of them will go shopping for shoes. One of them will go shopping for ham. They can do different things.

Researcher: Again, bringing it back to making it relevant to real life.

Irene: That will take some work, yeah.

Researcher: But the simulations like you are talking about give students a practical application of what they are learning versus translating on paper. Going to the supermarket and asking for whatever it is they are asking for versus reading about it in your workbook.

Irene: Yeah.

Researcher: Ok. Yeah, they actually do a lot of simulations inworld. There used to be a biology sim where you go and actually walk around inside a cell. Rather than staring at it under a microscope, which you could still do because you want to be able to see what it really looks like in the real world. But in order to learn the parts of the cell, they made this gigantic cell and shrank the avatars down. And the avatars could walk around inside the cell. So the teacher basically taught the lesson on the structure of a plant inside a plant cell.

Irene: It would even be cool, too, if you could show them first with a microscope and then with the avatar and then with the microscope again. It would be totally different perspectives on how they view the real thing.

### Dyslexia Coping Strategies and Accommodations

Understanding the strategies that students with dyslexia develop to cope with their difficulties can be very beneficial to instructors and instructional designers. Dyslexia is a very personal learning difference that tends to manifest differently for each student (Cottrell, 1966). However, in examining the coping strategies and most useful accommodations reported by the participants with dyslexia in the sample population, some commonalities emerge. Liz, Deborah, and Billy, all three of the participants with dyslexia in the sample population, relied on help from friends, family, and fellow students. Liz and Deborah also relied heavily on repetition of the course material as well as accessing the materials in multiple formats (audio recordings, video recordings, professor's lecture notes, in class lectures). Understanding the coping strategies of students with dyslexia can help instructors and designers build classes that help these students

without the need for extra accommodations. The interview responses above support the design and instructional practices of including multiple formats for delivering course materials.

Additionally, all three participants reported they did not use their accommodations in all of their classes, which is very common for students with learning disabilities (Aldridge, Case, 2007). This is very important for instructors and designers to remember. They may have students who have not requested accommodations in their classes. These responses help support the use of the Universal Design for Learning model in all classes as the model is designed to make classes accessible to a wide range of students without requiring specific accommodations to meet students' needs. All three of them felt they were not necessary in some classes. Deborah was unique in deciding to forgo her accommodations for a semester to challenge herself and to see if she could be successful without them. In the sections below, each participant's responses are explained in more detail.

### Coping Strategies

As part of their learner histories, the three participants with dyslexia discussed the coping strategies they developed to deal with the difficulties caused by their disabilities. They also discussed the accommodations they received and which were most helpful to them. Deborah provided the most detail about her coping strategies and accommodations. She relied heavily on help from family and friends to complete her writing assignments. However, she revealed in her second interview that it took her a while to feel comfortable enough to get help from her friends when she came to college.

Deborah: I've made friends who actually know what they're dealing with who will look over it, correct it as I'm doing something else and then press on.

Researcher: So you've got friends who can help you with...

Deborah: Yeah.

Researcher: And can get you through.

Deborah: It took me a while to let them in. They were like, let me edit your paper...I was like, no...It's between me and my teacher. It's completely embarrassing. And then one of them actually looked at it, and she was like, what the hell? I'm like, yeah, you weren't supposed to read that. She was like, no wonder. She just sat there and corrected everything. My closest friend is an English major, so this right here...I'm like her ultimate challenge. She's like, I want to see your paper. I feel like correcting everything. I take classes in the summer and she doesn't. So she'll go over to my paper and just like... And I'm like, you are ridiculous. I don't understand how you like this.

She also developed a very rigorous and disciplined study strategy that involves reviewing materials and lecture notes repeatedly before and after class lectures and ruthlessly eliminating distractions from her environment.

Deborah: For the touch of ADD, when I'm writing, typing up a paper, I have to make sure I have research saved to my thing and turn off my Internet so I won't search. I can easily avoid computer games, but there's other things like what's going on in ?? or what's on Facebook? Or what's on Tumblr? Or what's going on? I hide my cell phone. I hide everything else. It's just me and my laptop.

Researcher: You have good discipline.

Deborah: It took a lot. I'm now to the point, like, I have to graduate. I'm trying to overcome a lot of my disabilities because I'm trying to join the military and I don't want that to hinder me from becoming an Air Force officer.

Researcher: Cool.

Deborah: So I'm learning to overcome my writing of papers by reading everything slowly and out loud and not missing a word which is long and tedious, but it gets it done. Especially this semester Epidemiology consists of a paper every week and that was my hugest accomplishment. I only missed one paper out of the 12 of them. So I'm like, Yay! That right there was like, oh, my gosh...I can probably actually do this. I can probably actually go to grad school if I can do this. My lowest grade on any of those papers was I missed a point for two of them. And this was without me emailing my aunt and my dad and going through everything because I usually write them three hours before the class is done before it's due. I'm like, I don't have time, so I have to do the tedious reading out loud so that's helping me with my writing expressionism. My phone has a recorder that is amazing. I probably need one with a better speaker but that right there has helped me. If they have slides, if I can get access to slides, I will be like ?? everything is copasetic...I'm like, happiness.

Researcher: Do you look at the slides before the class or after the class?

Deborah: I look at them briefly before the class. And then I print them out. I write beside them. I'm listening to the teacher. I'm just writing what I hear and not looking because I don't need to see any of the visuals because I've already seen them before briefly. And then afterward I type everything I have written down or add it or scratch it out...especially with my Drug teacher. He'll make all his slides at the beginning of the semester but he'll add and subtract things all the time so unless you get the most up to date, two minutes before the class, it's not the same. So it keeps me always, I'm scratching and I'm writing, and if it's a point he says it a couple of times. So if I didn't hear it, I can go back. And I always have someone else in the class...I always know someone there where I'm like, can I compare my notes to you because you know I was there.

Researcher: That's cool. So you write your notes on the slide so that you don't have to watch. You don't have to look up and try to go back and forth

Deborah: Yes. Because I will get completely distracted. And people asking questions. That's one of my biggest things. I had to leave a class because a girl wouldn't stop asking. I could not learn with her in the class.

Researcher: Just kind of taking things off track?

Deborah: Yes. I can't focus. There's a guy in my Epidemiology class that I just want to throw paper wads at him because it doesn't consist of what we are trying to learn about. I need to get her point, what she is trying to get across to me, down so that when I come back to it, I can study it, rewrite it, understand it so when it comes to the test, I can pass it. But if you are asking her, talking about children and it has nothing to do...because we all know our teachers' little niches to make them go off on a tangent. And you talk about diet pills so spends 30 min on diet pills and it had nothing to do with the subject. I get very annoyed and when she comes back to the subject, I'm nowhere near as focused as I was at the beginning of the class.

Additionally, Deborah used both audio and video recordings of lectures to help her ensure her notes and understanding of the material were as complete as possible. She did not read the textbooks for most of her classes, though she did read the professor's notes if she had access to them. She relied primarily on class lectures to ensure she understood the class materials. Unfortunately, she also had difficulty concentrating on the lecture if there were other distractions in the classroom. Consequently, she also relied on copies of notes from other classmates to help her understand any material she missed during class.

Deborah: So I have to sit in the front of the class because in every class there is someone looking on Facebook and I'm going to find them and see what they are looking at. Especially Botany. Guy was looking at trench coats in Botany. I'm like, why are you

looking for trench coats? It's 90 degrees outside. I missed that whole entire lecture because he spent the whole entire class looking at trench coats. But luckily the guy beside me is a scribe for the court, and he's like, I'll email you your notes. I'm like, thank you. And he's like, and you have a recording.

Billy was a much less disciplined student, often forgetting to do assignments or homework. He also did not read textbooks or other written class materials, nor did he review class notes or professor notes. He stated that he does not record lectures because he would not spend the time to listen to them again later. His coping strategy was primarily to work with other students in his classes, often reverse engineering their solutions to figure out the concepts in the class.

Researcher: Do you ever record your classes?

Billy: No.

Researcher: Do you think that would be helpful?

Billy: Probably not because it would mean I'd have to sit through the whole class basically again in order to get any recognition out of it and that's double time investment.

Billy: In classes it (biggest difficulty in class) would probably be remembering to do homework. Getting encouraged enough to do the homework especially when it's not a lab or ? homework. And reading textbooks. Which I have not done in a long time. Unintelligible learning from other people.

Researcher: Do you mean like sharing notes?

Billy: Get with other people who do learn well. And then ask to see their homework, see what they've done, see their projects, see what they've done. And then reverse engineer that in order to figure out how they did what they did. Learning through example even from the examples unintelligible

Researcher: You mentioned getting encouraged enough to do the homework. What encourages you to do the homework?

Billy: If it's something that I actually enjoy or if it's doing something. As opposed to just calculations.

Researcher: If it's something you enjoy or something that's ?. Unintelligible. Have your difficulties that you have encountered affected your grades or getting through your classes. If so, how?

Billy: Yes, not doing homework has affected me a lot. Not getting up with the books has occasionally affected me. Not having the book in several classes has not affected me that much.

Researcher: What about your grades?

Billy: Grades have been not that great for most of my classes. Since I haven't, I've stopped trying in a lot of my classes. Just sort of trying to get out of school and get into the world. And since I have a job in the real world doing what I want to do which the degree is supposed to let me do. And I don't use anything from the degree in the actual job. There's very little motivation to actually learn anything that they're teaching because I can do everything at the job without knowing any of it. I just need my little piece of paper.

Liz only briefly explained her coping strategies. Primarily, she used copies of the professor's notes and her classmates' notes to fill in blank spots in her own notes. She did record lectures and replay them later for some classes. Liz also strongly preferred online classes because she could review course materials in any order, as often as she wants. Interestingly, Liz relied more on individual strategies and less on help from family, friends, and other students.

All three participants with dyslexia strongly preferred classes with lots of hands on learning opportunities. Additionally, they all reported being more successful in classes where they can practice what they are learning and get immediate feedback. The participants without dyslexia also reported being more successful in classes structured this way as well, lending support to the use of more hands on learning activities for all students.

## Accommodations

Billy, Liz, and Deborah also spoke about the accommodations they received for their disabilities. Billy reported that he did not usually use his accommodations (extended time on tests, extended time on assignments) unless he thought they would help him get out of doing assignments or encourage his professors to be more lenient in grading his work. Liz reported that she used her accommodations when she felt they were necessary but that some classes did not

require them. The accommodations she used the most were the ability to record classes, having a scribe help her take notes, and getting extended time on tests, which are common accommodations for students with various disabilities (NCES, 2011). Deborah used her accommodations extensively in every class. The accommodations she used most were the ability to record lectures using both audio and video for some classes, permission to use her laptop in all of her classes, scribes to help her take notes, alternative testing environment, additional time on tests, and assistance filling in bubble sheets for multiple choice tests. Deborah's accommodations to allow her to video record lectures and have assistance filling in bubble sheets for tests are somewhat unusual, though she reports they have been very helpful for her.

Deborah: I get additional time on tests because I have to read the question like six or seven times. And bubbling letters are my enemy. Depending on whether I can handle it. If it's 20 questions, I'm good. If it's 50 questions, I'm good. If it's 150, I'm going to just write down the letter on the test and give it to someone else to bubble because I will mix my c's and my d's. My c's and d's and a's..no..a's I actually get right. My c's, b's, d's and e's. The d's and e's are the...it's a disaster. I didn't use my accommodations because I wanted to see how I would do without them this semester. And I didn't use it in my First Aid. My first test was a disaster because she wouldn't let us write on our test. I missed 6 questions and all 6 questions were because they were c and it was supposed to be d, and I had c bubbled...I had the right answer written down and the wrong answer bubbled. And it wasn't because I was trying to be, oh it could be this. No, I knew it was that but it didn't translate. From then on she was like, you can actually write on your test. When we are done with class, you can come read me your answers and I'll make sure your bubble sheet matches.

Liz and Deborah reported that their grades improved tremendously when they started receiving their accommodations. Billy reported no change in his grades due to his accommodations. Interestingly, Deborah decided to stop using her accommodations just prior to the study because she is planning to enlist in the Air Force as an officer when she graduates. She wanted to challenge herself to succeed without her accommodations so that she can achieve her career objectives in the Air Force. However, she stated she would not have been able to succeed if she had not learned about her disabilities and used her accommodations to help her learn how



to learn and be successful academically. Her drive and determination are interesting contrasts to a commonly held belief by some uneducated faculty that students with learning disabilities are lazy or not motivated to work hard in their academic lives.

### Research Problem Results

In the sections below, the research question and sub questions that guided the study are reiterated and discussed.

- Does the Second Life course design presented in the study meet the needs of the dyslexic students in higher education who participated in the study?

Overall, two of the three participants with dyslexia felt the course design met their needs. Billy was the only participant with dyslexia who felt the course design did not meet his needs because there were too many distractions in the Second Life environment and he felt the course materials were not integrated into the course environment tightly enough as they were accessed via an external website. However, Billy did agree that the text materials were manageable and easy to understand. All three felt the video materials helped them understand the course concepts as well. Additionally, all three reported they would be more motivated to take an online course in Second Life than in more traditional learning management systems such as Blackboard. Even Billy stated he felt he would be more likely to log into a course in Second Life than one in Blackboard.

### Sub Questions

- Is the course easily navigable?

All participants except for Irene reported the course was easy to navigate. Cheryl, Liz, and Rachel all felt they were able to find course materials and course activities more easily than

in Blackboard because they could visually see them in the course design instead of being required to click through many layers of links to locate materials and activities, as is required in Blackboard.

- Are the course materials easily accessible?

All participants were able to access all of the course materials. Irene reported she was unable to find the materials in her initial follow up interview, but review of the video from her course exploration showed that she was able to view and interact with all of the course materials. Billy and Jack elected to access all of the course materials from one view screen instead of moving to the different course areas set up for each course topic, but they were able to still access all of the content. Liz and Rachel also commented that they liked the fact they could access the materials from anywhere in the garden (course area).

- Do the modalities in which the course materials are presented meet the needs of the participants?

Overall, the participants in the sample population reported the modalities used to present the course materials met their needs. They offered suggestions for making the materials better (discussed below). The majority of the participants reported that the videos included in the course helped them better understand the material. Additionally, they all reported the text materials were very easy to read and understand.

- What do the participants like about the course?

Primarily, the participants liked the visual elements in the course and the interactivity in the course environment. They also liked that they could access the materials from anywhere in the course area and in any order they wanted. Several also commented on the common areas which allowed for more interpersonal interaction between students as well as interaction between the instructor and students. Three of the participants liked the fact that they could meet with the

instructor in his or her virtual office. Deborah mentioned she would feel more comfortable meeting with her instructors in Second Life than she feels meeting with them in person.

- What do the participants dislike about the course?

Jack disliked the subject matter of the course and was uninterested in conducting more than cursory exploration of the course. Billy and Jack both disliked the course materials delivered via an external web site. Billy also disliked the distractions in the environment. Several participants disliked the technical difficulties they experienced, especially when course materials would not display properly. Some participants also felt the course area was too small. Additionally, many of the participants disliked being alone in the course as they were evaluating it. They felt they were unable to fully evaluate the course because they could not complete the group exercise in the course or interact with other learners or the instructor.

- What would the participants change about the course design?

All eight of the sample population participants were asked what they would like to change to improve the course design. Their suggestions are discussed below.

- Interpersonal interaction

All of the participants felt the course would be better if they had been able to interact with other people. Irene, Rachel, Billy, and Nathan all felt they would have been able to better evaluate the course if other people had been present while they were exploring the course design.

- Increase size of course area

Cheryl and Nathan all felt the course area should be larger. Nathan stated that it would be “more fun” to have a larger course area to explore. Cheryl also felt the course would be more engaging with a larger area. Deborah did not specifically discuss a larger

course area, but she spent significant time exploring the other courses that were hosted on the same island as the study.

- Include more interactive content and objects

Billy felt the course would be better if an avatar inside the environment presented the course material in some way. Cheryl wanted more items and objects with which to interact. Irene suggested adding areas like a break room with drinks and food to make the environment more “real.” Jack, however, felt the environment already had too many superfluous items because it included chairs in which avatars could sit. He felt items like these were useless because avatars are not “real.” None of the other participants appeared to agree with this opinion. The rest of the participants sat in the chairs throughout the design and interacted with the pose balls which allowed them to sit in various positions in the different course areas.

- Improve navigation in course

Liz suggested that the materials in the course be labeled more clearly. In the course design she evaluated, the materials all have generic labels, such as “apple.” The apples in each section of content are color coded, but the way these items are displayed in the Second Life environment makes it difficult to distinguish the colors. She also suggested that the view screens in each section have text on them to tell the student what content is on that screen. Irene also suggested text be added to the screens. She stated she would have been more inclined to explore the screens if they had something on them rather than being blank.

- Minimize distractions

Jack and Billy both felt the current design had too many distractions. Billy

suggested moving the course inside a building or structure. Jack suggested moving the course to a space without any buildings or other structures that were not related to the course. Both felt an island dedicated to just the course would be less distracting. However, Billy still wanted to be able to “wander around within the environment, or within the course environment,” but he wanted to be confined to the course space so that he could not “wander off to anywhere.” It should be noted that Jack and Billy were alone in this opinion. None of the other participants felt the layout of the current design was distracting. However, Deborah found the water sounds in the Zen garden to be distracting. Cheryl and Liz both found the water sounds soothing. None of the other participants mentioned the water sounds.

- Include more, shorter videos

Billy and Jack both felt the introduction video was too long. They suggested it be broken into smaller segments. Deborah also mentioned adding more, short videos to the class and using them as writing prompts for class discussion questions. Rachel also suggested adding more video clips to help explain the concepts in the course and demonstrate them more clearly. She stated that simply reading about the concepts was less effective for her than seeing them demonstrated as well.

- Incorporate voice communication

Irene, Rachel, and Nathan all felt that incorporating voice communications would improve the course due to increased and improved communication between students and with the course instructor. Irene was very excited about the possibilities incorporating voice capabilities would bring to foreign language classes taught using the course design. Rachel stated voice communication would help make communication clearer due to

transmission of tone of voice and vocal inflection, which are absent from text based communications used in most online classes. She often had difficulties fully understanding her classmates in her online classes, especially if they attempted to use sarcasm or humor in their written communication.

- Incorporate more Second Life simulation capabilities

Irene and Nathan both wanted to incorporate more of the simulation capabilities inherent in the Second Life environment. Nathan suggested having the class collaboratively build the space for the course. He also suggested having students change the appearance of their avatars to reflect the subject matter of the course, especially for subjects related to professional communities like medicine. The example Nathan gave was having students in a medical class edit their avatars to include white coats so they can start seeing themselves as part of the medical profession. Irene felt that creating or visiting simulation that already exist would strongly improve foreign language and history classes. She used visiting the fountains in Paris or shopping in a foreign country as examples. She felt these simulations would make the material much more engaging and relevant for students. She also felt students' learning and retention would be improved by incorporating these simulation elements.

- Embed the content more in Second Life

Jack and Billy both felt the course materials needed to be more internally connected to Second Life instead of delivered via an external web page. They both stated that they felt the course was just a web-based course inside a virtual environment rather than a class actually in the virtual environment.

## Implications for Instructional Design

One of the initial concerns with using the garden metaphor for the course design was that students would be unable to navigate through the course or would be confused by the lack of a more traditional classroom structure. However, none of the participants in the sample population had difficulty navigating the garden theme. Additionally, they were all able to find the course materials and course activities, though Irene struggled because of her difficulties with the Second Life environment.

The sample participants had some good suggestions to further improve course navigation including finding better ways to label apples and screens. One of the limitations with the Second Life environment is that it displays labels for items that are not visible to the student, such as items that are behind walls or in on the other side of the central tree. Consequently, some of the sample participants had some difficulty determining which apple contained the text for the topic they were viewing on the screen. Another limitation was with the view screens themselves. The ones used in the study did not display anything when they were not in use. This coupled with the label confusion made it difficult for some participants in the sample to figure out what was behind the screens, and in Irene's case, that there was anything behind some of the screens at all.

Another goal of the course design was to create and structure the course content so that it could be viewed in a nonlinear manner and still make sense. In analyzing the interview responses and course experiences of the sample population, the design was successful in reaching this goal. Each of the participants in the sample chose a different path through the garden and course materials. However, each of them reported the materials were easy to understand, regardless of the route they took to interact with them.

The course design also included course materials in multiple formats with the goal of making the course contents more accessible and easier to understand for the sample participants, both those with and without dyslexia. This goal was met as well. All of the participants in the sample reported the videos helped them understand the course content better than simply reading the text. The only complaints they had about the videos is that some of them were a little too long and that one was boring. All sample participants suggested that more, shorter videos be incorporated into future revisions of the course design.

The purpose for designing the course inside a virtual environment like Second Life was to attempt to create a more interactive and engaging online course in a visually engaging environment. The current design partially met that objective. Most of the sample participants reported they liked the interactive elements of the course. However, they all felt more interactive elements including more simulation elements would greatly improve the design. The original course design called for interactive bots scripted to help students practice the interpersonal conflict resolution skills presented in the course materials. Unfortunately, these bots could not be fully developed in time to be included in the study. Including them in future revisions of the course should make the design much stronger and more beneficial to the students by increasing the interactivity of the course and adding practice opportunities with immediate feedback to help students fine tune their understanding of the course content.

### Lessons Learned

In addition to the research findings elicited by the study, I also learned several lessons that will help improve future iterations of the study. These lessons and their implications are discussed below.



Several participants expressed frustration with evaluating the course design because they were unable to interact with other students or an instructor during the observation phase of the study. They reported feeling unable to fully evaluate the course activities because they were unsure of how they would be implemented in an actual course. Having other participants and an instructor present during the observation sessions would have possibly provided a more authentic experience for the participants and would have possibly allowed them to evaluate the personal interaction and collaboration capabilities of the course design and the Second Life environment, elements that many of them felt were important, especially in online classes. Additionally, extending the duration of the study to allow participants to complete course activities would have been beneficial, as was suggested by several participants in the sample.

Opportunities for participants to learn to use Second Life prior to the observation phase might have improved results and garnered more feedback about design instead of difficulties with the environment. Implementation of more sophisticated help bots and practice bots would possibly have provided more support to the participants in addition to potentially making the course more interactive and allowing for more hands on practice opportunities

Another challenge to incorporating technologies of any kind into learning is keeping up with software updates and changes. As the course design and materials were being developed in Second Life, Linden Labs, makers of Second Life, released a new user interface or “viewer” for Second Life, which was very unpopular with the Second Life user community. The designer and researcher tested the new viewer and determined that it would be disruptive to the participants of the study due to significant changes in the interface and how the user interacted with the environment. Additionally, the new viewer required PDF files, which were a key component of the course materials, to be displayed outside the Second Life environment instead of inside the

environment as the original viewer allowed. Consequently, the designer and researcher decided to conduct the study using the older viewer.

Unfortunately, two days prior to the start of the study, Linden Labs released a new update to Second Life that disabled the display of PDF files and video files entirely in the older viewer. As both video files and PDF files were important elements to the course design, the designer was forced to upgrade to the newer viewer. However, due to the extremely protracted testing time available to the designer prior to the start of the study, some of the course elements were not adequately tested. Additionally, much of the course content was displayed externally in a web browser, which was confusing for some participants.

The new viewer also broke other elements of the design. For example, the video screens the designer had incorporated into the course design ceased to function as soon as he upgraded to the new viewer. Additionally, he was unable to find adequate solutions for elements such as the course discussion board and course calendar. I had to find solutions for these elements the day prior to the start of the study. Consequently, these elements were not adequately tested.

Extensive, and expensive, hardware requirements necessary to run Second Life are another major challenge to implementing it in an educational setting. In order to mitigate the significant computer requirements necessary to run Second Life, I secured space in a computer lab in which to conduct the study. Participants would all explore the course on the same machine, which could be configured to minimize issues with the Second Life environment. Additionally, the software used to record the sessions could be installed and maintained on one computer. Unfortunately, the machine in the lab was not adequate to provide an optimum experience in Second Life, especially while also running the recording software. Consequently, participants had issues with files not opening and web pages not displaying properly inside Second Life.

Several participants had difficulty getting their avatars to move and interact with the environment smoothly due to “lagging,” difficulty with the computer’s ability to process images and instructions from the Second Life environment smoothly.

To minimize these types of difficulties in future studies, all hardware and software must be thoroughly tested prior to the start of the study. The start date of the study may need to be adjusted to accommodate this testing. Additionally, people not affiliated with the design or build of the study should be included in the testing process. This will help ensure there are no permissions issues which will prevent items or content from behaving as designed.

Finally, ensuring trustworthiness and rigor is a challenge in qualitative research designs. There are several accepted methods for achieving this, but member checking is commonly used. However, member checking was not effective with the participants in the study due to the reading difficulties experienced by the participants with dyslexia. Billy stated that he would not read the transcripts of his interviews because they were too long. Deborah said she would try to read them, but she was afraid she would not have the time necessary to read and understand them. Of the eight participants, only Liz and Rachel reviewed their transcripts and offered corrections and clarifications. The other five sample participants offered no changes or corrections to their transcripts, even when they indicated they understood the importance of the member checking process to ensuring the data was complete and accurate.

### Suggestions for Further Research

The current study was intended as a launching point for further research on using virtual environments like Second Life to deliver online learning that better meets the needs of students with dyslexia as well as those without dyslexia. In this section, suggestions for further research

in this area are presented. Using the lessons learned and participant suggestions, I offer the following suggestions for further research on the topic.

The current study used a very small sample population of participants to complete the qualitative data collection portions. To improve the generalizability of the findings, the study should be repeated with a larger population of students, both with and without dyslexia. Recruit the population from multiple institutions to get a larger representation of the population as a whole. Additionally, recruiting from multiple institutions should allow me to increase the number of students with dyslexia in the study.

Most of the participants in the current study stated they would have been better able to evaluate the effectiveness of the design if they had been able to take the course “live.” In other words, they wanted to experience the course as if it was an actual course they were taking. Expanding the course materials included in the study and increasing the amount of time participants have to interact with the course will allow participants more opportunities to thoroughly evaluate the course design, materials, and activities.

Another complaint most participants had about the current study was that they were alone in the course. Consequently, they were not able to evaluate the capabilities in the environment for inter personal communication between students or with the instructor. They were also unable to adequately evaluate the group project or the course social areas as there was only one participant in the course at a time. Including multiple participants and the course instructor in observation sessions will give participants opportunities to experience and evaluate the interpersonal interaction possibilities in the environment.

Another difficulty in the study was getting participants to come in to the lab to complete the observation and interview data collection phases. Allowing participants to complete the

observation and interview phases within Second Life from their own computers rather than requiring them to come to a lab for these phases could alleviate this difficulty. This will allow much greater flexibility in scheduling as well as allowing for participants from a greater geographical area. However, it also introduces other potential issues such as ensuring participants' computers have the required hardware and software to access the virtual environment. Additionally, recording the observation sessions could be challenging since all of the participants would be required to install the recording software on their computers and upload the files to the researcher. Alternatively, the researcher could record the observations from his or her computer, but that would provide less rich data as this method would not record the screens and course materials the participants reviewed during the observation session.

The participants in the sample provided several suggestions for improving the course. Incorporating the improvements suggested by the participants into the course design and repeating the study should enrich the data already collected from this study. These include expanding the physical size of the course, adding more interactive content to the course, incorporating more videos into the content, and adding more text and navigational aids to the course objects in the Second Life environment.

All of the participants struggled to some degree with the mechanics of moving and interacting with objects in Second Life. Most of the participants were able to overcome these difficulties fairly quickly. However, a tutorial prior to the study would possibly alleviate these difficulties even further and help participants be less distracted by them during the study.

One of the largest obstacles in the current study was technical issues with the Second Life environment including trying to find or write scripts that enabled the course to fully function as designed. A new learning management system, called Vushi, has been developed to work within

Second Life. Vushi incorporates tutorials, user support, and access management as well as methods for delivering assessments, assignments, and managing discussion boards within Second Life. Repeating the study using combinations of technology, such as Vushi, should help remediate some of the technical issues.

## Conclusion

This chapter presented the results of the current study including the emergent themes from the triangulation of all three data sources, implications for future instructional design practices and models, lessons learned from the difficulties experienced in the current study, and suggestions for further research. Interaction/engagement and student control emerged as the top two themes present in the survey results, interviews, and observation recordings. These two themes strongly influenced participants' experiences in their previous classes, both online and face-to-face, as well as their experiences and responses in the study. This was true for participants with and without dyslexia.

Participants with and without dyslexia had similar experiences and responses to the course design in the study. Their experiences with prior online and face-to-face classes differed, though both groups of participants, those with and without dyslexia, reported their top difficulties in both their face-to-face and online classes were time management and keeping up with course reading requirements. These results support the use of universal design principles to create courses that are more effective for students with a wider range of learning needs rather than using more limited design methodologies and adding individual accommodations for students who need them. Because the sample size was so small, further research on this topic is necessary to develop more generalizable theories and models.

There appeared to be no significant correlation between participants' experience with video games and their experiences in the course design or the Second Life environment. Participants with little or no gaming experience had no more difficulty with the Second Life environment than those with extensive gaming experience. Interestingly, there were two participants in the eight participant sample with very limited gaming experience and one participant with no gaming experience. The survey results for the entire population showed that 88% of the participants reported they played video games 0-5 hours per week.

As is the case with incorporating most instructional technologies into learning, technical issues were a factor in this study as well. Though they were significant for some participants, all of the participants were still able to access and understand the course materials. More thorough testing of all technical aspects of the design could have alleviated many of the technical difficulties in the study. Additionally, providing tutorials to help participants become more comfortable with the virtual environment prior to the start of the study would also have potentially alleviated some of the more distracting technical issues participants experienced during the study.

The course design met the top instructional design objectives of creating a course in a virtual environment that students could easily navigate, without the visual elements or structure of a traditional classroom. The course design was also nonlinear, meaning participants could access the materials in any order and still understand the content. The sample participants also confirmed that the use of multiple modalities to deliver course materials enhanced their understanding of the materials more than simply reading text on the topic.

The design partially met the objective to create an interactive and engaging course through the use of a virtual environment. Including more interactive content, such as bots

programmed to help them practice the course content, and more tightly embedding the course materials into the environment will improve the design, according to the suggestions for improvement offered by the sample participants.

As stated above, the current study was intended as a launching point for further research on using virtual environments like Second Life to deliver online learning that better meets the needs of students with dyslexia as well as those without dyslexia. This chapter concluded with many suggestions for improving on and repeating the current study to further develop the themes and ideas that emerged from the current study. Given the number of students with dyslexia and other learning disabilities enrolling in higher education, this is an important topic for researchers, practitioners, and educators to study further.



APPENDIX A  
SURVEY CONSENT FORM

## University of North Texas Institutional Review Board Informed Consent Form

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose, benefits and risks of the study and how it will be conducted.

**Title of Study:** Online Course Design Elements to Better Meet the Academic Needs of Students with Dyslexia in Higher Education

**Principal Investigator:** Greg Jones, PhD, Associate Professor in the University of North Texas (UNT) Department of Learning Technologies.

**Key Personnel:** Mary Dziorny, Doctoral student in the University of North Texas (UNT) Department of Learning Technologies.

**Purpose of the Study:** You are being asked to participate in a research study designed to find ways to design online courses that better meet the needs of students with dyslexia.

**Study Procedures:** You will be asked to complete an online survey that will take about 20 minutes of your time. If you wish to participate in the rest of the study, you will be asked to evaluate an online course design in Second Life which will take approximately an hour of your time. You will then be asked to participate in two or more follow up interviews to further capture your impressions and opinions of the course design and how well it meets your needs as a learner. Each interview will take about 30-45 minutes.

**Foreseeable Risks:** No foreseeable risks are involved in this study.

**Benefits to the Subjects or Others:** This study is not expected to be of any direct benefit to you. However, the information gained from this research may allow instructional designers and faculty to design online courses to better meet the needs of dyslexic students in higher education.

**Compensation for Participants:** If you complete all phases of the study, you will be entered into a drawing for a \$50 Amazon.com gift card.

**Procedures for Maintaining Confidentiality of Research Records:** You will be asked to create an avatar name which is the only personal identifier that will be requested of you during this study. Recordings of the observation and interview phases will be stored digitally on a secure server and encrypted. Signed consent forms will be stored in a locked drawer in the office of the Principle Investigator. Coding data, original results, and written analyses will be stored there during the research and for a period of three years following the study. There are no plans to make the raw data available to any individuals other than the investigator and the key personnel. The confidentiality of your individual information will be maintained in any publications or presentations regarding this study.

**Questions about the Study:** If you have any questions about the study, you may contact Mary Dziorny at telephone number XXX-XXX-XXXX or the Principal Investigator, Dr. Greg Jones, UNT Department of Learning Technologies, at telephone number XXX-XXX-XXXX.

**Review for the Protection of Participants:** This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT

IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

**Research Participants' Rights:**

By clicking the link below to access the survey, you indicate that you have read or have had read to you all of the above and that you confirm all of the following:

- Mary Dziorny has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as a research participant and you voluntarily consent to participate in this study.
- You have been told you will receive a copy of this form.

APPENDIX B  
OBSERVATION/INTERVIEW CONSENT FORM

## University of North Texas Institutional Review Board Informed Consent Form

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose, benefits and risks of the study and how it will be conducted.

**Title of Study:** Online Course Design Elements to Better Meet the Academic Needs of Students with Dyslexia in Higher Education

**Principal Investigator:** Greg Jones, PhD, Associate Professor in the University of North Texas (UNT) Department of Learning Technologies.

**Key Personnel:** Mary Dziorny, Doctoral student in the University of North Texas (UNT) Department of Learning Technologies.

**Purpose of the Study:** You are being asked to participate in a research study designed to find ways to design online courses that better meet the needs of students with dyslexia.

**Study Procedures:** You will be asked to complete an online survey that will take about 20 minutes of your time. If you wish to participate in the rest of the study, you will be asked to evaluate an online course design in Second Life which will take approximately an hour of your time. You will then be asked to participate in two or more follow up interviews to further capture your impressions and opinions of the course design and how well it meets your needs as a learner. Each interview will take about 30-45 minutes.

**Foreseeable Risks:** No foreseeable risks are involved in this study.

**Benefits to the Subjects or Others:** This study is not expected to be of any direct benefit to you. However, the information gained from this research may allow instructional designers and faculty to design online courses to better meet the needs of dyslexic students in higher education.

**Compensation for Participants:** If you complete all phases of the study, you will be entered into a drawing for a \$50 Amazon.com gift card.

**Procedures for Maintaining Confidentiality of Research Records:** You will be asked to create an avatar name which is the only personal identifier that will be requested of you during this study. Recordings of the observation and interview phases will be stored digitally on a secure server and encrypted. Signed consent forms will be stored in a locked drawer in the office of the Principle Investigator. Coding data, original results, and written analyses will be stored there during the research and for a period of three years following the study. There are no plans to make the raw data available to any individuals other than the investigator and the key personnel. The confidentiality of your individual information will be maintained in any publications or presentations regarding this study.

**Questions about the Study:** If you have any questions about the study, you may contact Mary Dziorny at telephone number 214-704-6671 or the Principal Investigator, Dr. Greg Jones, UNT Department of Learning Technologies, at telephone number 940-565-2571.

**Review for the Protection of Participants:** This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT

IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

**Research Participants' Rights:**

Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- Mary Dziorny has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as a research participant and you voluntarily consent to participate in this study.
- You have been told you will receive a copy of this form.

\_\_\_\_\_  
Printed Name of Participant

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

**For the Principal Investigator or Designee:**

I certify that I have reviewed the contents of this form with the subject signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the participant understood the explanation.

\_\_\_\_\_  
Signature of Principal Investigator or Designee

\_\_\_\_\_  
Date

APPENDIX C  
SURVEY

Thank you for taking the online survey for this study. I appreciate your time and thought as you complete the following questions. There are a total of 35 questions in this survey. However, you may not see all of them based on your answers to previous questions. This does not exclude you from the other phases of the study. Again, thank you for your time in completing this survey. There are 35 questions in this survey

#### Classes/Schoolwork

1 [cs1] Do you experience any of the following difficulties when attending or studying for your face to face classes? \*

Please choose all that apply:

- Reading or understanding text
- Writing papers or other assignments
- Keeping up with course readings and/or assignments
- Organization
- Time management
- Listening or understanding verbal lectures or instructions
- Completing assignments by their due dates
- None/Not applicable

2 [cs2] Please describe any other difficulties you experience.

Please write your answer here:

3 [cs3] Do you experience different difficulties when attending or studying in your online classes than in your face to face classes? \*

Please choose only one of the following:

- Yes
- No
- I've never taken an online class.
- Other

4 [cs4] How are the problems you experience different in your online classes? \*

**Only answer this question if the following conditions are met:**

Answer was -oth-'Other' or 'Yes' at question '3 [cs3]' (Do you experience different difficulties when attending or studying in your online classes than in your face to face classes?) and Answer was A1'Other' or 'Yes' at question '3 [cs3]' (Do you experience different difficulties when attending or studying in your online classes than in your face to face classes?)

Please write your answer here:



Dyslexia/Learning Disabilities

5 [ld1] Are you registered for any accommodations with the Office of Disability Accommodations at UNT? \*

Please choose only one of the following:

- Yes  
 No

6 [ld2] Do you consider yourself dyslexic? \*

Please choose only one of the following:

- Yes  
 No

7 [ld3] How long have you known you are dyslexic? \*

**Only answer this question if the following conditions are met:**

Answer was Y'Yes' at question '6 [ld2]' (Do you consider yourself dyslexic?)

Please choose only one of the following:

- Less than a year  
 1-3 years  
 4-5 years  
 More than 5 years

8 [ld4] What accommodations have you had because of your dyslexia? \*

**Only answer this question if the following conditions are met:**

Answer was Y'Yes' at question '6 [ld2]' (Do you consider yourself dyslexic?)

Please choose **all** that apply:

- Modified assignments  
 Modified tests/assessments  
 Extended time on assignments  
 Extended time on tests  
 Alternative test environment  
 None  
 Other:

9 [ld5] Did you have your accommodations prior to coming to college? \*

**Only answer this question if the following conditions are met:**

Answer was Y'Yes' at question '5 [ld1]' (Are you registered for any accommodations with the Office of Disability Accommodations at UNT?)

Please choose only one of the following:

- Yes
- No

10 [ld6] When did you first have your accommodations? \*

**Only answer this question if the following conditions are met:**

Answer was Y'Yes' at question '9 [ld5]' (Did you have your accommodations prior to coming to college?)

Please choose **only** one of the following:

- PreK-3rd grade
- 4th-5th grades
- 6th-8th grades
- 9th- 10th grades
- 11th- 12th grades
- Other

#### Online Classes

11 [oc1] Have you ever taken a class online? \*

Please choose **only** one of the following:

- Yes
- No

12 [oc2] How many classes have you taken online? This includes fully online classes, hybrid classes that meet partially online and partially face to face, and web enhanced classes which meet regularly face to face but incorporate some online course elements. \*

**Only answer this question if the following conditions are met:**

Answer was Y'Yes' at question '11 [oc1]' (Have you ever taken a class online?)

Please choose **only one** of the following:

- None
- 1-2 classes

- 3-5 classes
- 6-10 classes
- More than 10 classes

13 [oc3]How many classes were fully online? This means you did not have any face to face class meetings. All course meetings and activities were completed online. \*

**Only answer this question if the following conditions are met:**

Answer was Y'Yes' at question '11 [oc1]' (Have you ever taken a class online?)

Please choose **only one** of the following:

- None
- 1-2 classes
- 3-5 classes
- 6-10 classes
- More than 10 classes

14 [oc4]How many classes were hybrid/blended? This means you met face to face for some classes but most of the course activities were online. \*

**Only answer this question if the following conditions are met:**

Answer was Y'Yes' at question '11 [oc1]' (Have you ever taken a class online?)

Please choose **only one** of the following:

- None
- 1-2 classes
- 3-5 classes
- 6-10 classes
- More than 10 classes

15 [oc5]How many web enhanced classes have you taken? This means your class met for regular class times but some course components were online. \*

Please choose **only one** of the following:

- None
- 1-2 classes
- 3-5 classes
- 6-10 classes
- More than 10 classes

16 [oc6]On which online system(s) did you take your classes? Check all that apply. \*

Please choose **all** that apply:

- Blackboard
- WebCT
- eCampus
- Angel Learning
- Desire 2 Learn
- Professor's/Course website
- I don't know
- None of the above/Have not taken any online or web enhanced classes
- Other:

Online and gaming experience

17 [oge1]Do you own your own computer? \*

Please choose **only one** of the following:

- Yes
- No

18 [oge2]Did you have a computer at home growing up? \*

Please choose **only one** of the following:

- Yes
- No

19 [oge3]How many hours do you estimate you spend online each week for work? \*

Please choose **only one** of the following:

- 1-10 hrs
- 11-20 hrs
- 21-30 hrs
- 31-40 hrs
- 40+ hrs

20 [oge4]How many hours do you estimate you spend online each week for class? \*

Please choose **only one** of the following:

- 1-10 hrs
- 11-20 hrs
- 21-30 hrs
- 31-40 hrs
- 40+ hrs

21 [oge5]How many hours do you estimate you spend online each week for other activities? \*

Please choose **only one** of the following:

- 1-10 hrs
- 11-20 hrs
- 21-30 hrs
- 31-40 hrs
- 40+ hrs

22 [oge6]What other activities do you do online? \*

Please choose **all** that apply:

- Surfing the Web
- Social networking (Facebook, Twitter, etc)
- Playing games
- Watching videos
- Watching TV shows or movies
- Other:

23 [oge7]Have you heard of Second Life? \*

Please choose **only one** of the following:

- Yes
- No

24 [oge8]What is your experience with Second Life? \*

Please choose **all** that apply:

- None/I've never heard of it
- I've logged in once or twice
- I have logged in many times
- I have multiple toons or avatars in Second Life
- I own or have owned land
- I have built buildings or other objects
- I have taken a class inworld
- I have created scripts or scripted objects
- I have explored the grid
- I am very experienced inworld
- Other:

25 [oge9]Approximately how many hours a week do you spend playing video games? \*

Please choose **only one** of the following:

- 0-5 hrs
- 6-10 hrs
- 11-15 hrs
- 16-20 hrs
- 20+ hrs

26 [oge10]What games do you typically play? \*

Please write your answer here:

## Demographics

You **MUST** complete the following questions if you wish to be considered for the remaining phases of this study, which consist of an observation session and two or more follow up interviews. The observation session and first follow up interview will take approximately two hours. Subsequent follow up interviews will take less than an hour each. All of the remaining phases of the study will take place at the Discovery Park campus. Please be sure that you include a valid email address that you check frequently. **All participants who complete all phases of the study will be entered into a drawing for a \$50 Amazon gift card.**

27 [demo1]Your name:

Please write your answer here:

28 [demo2]Email: (Please enter an email address that you check frequently.)

Please write your answer here:

29 [demo3]What's your major?

Please write your answer here:

30 [demo4]When would you be available to complete the observation and interview phases of the study?

Please choose **all** that apply:

- Friday March 11 10:00am-12:00pm
- Friday March 11, 2:00pm-4:00pm
- Friday March 11, 4:00-6:00pm
- Friday March 11, 6:00-8:00pm
- Monday March 14, 2:00-4:00pm
- Monday March 14, 4:00-6:00pm
- Monday March 14, 6:00-8:00pm
- Tuesday March 15, 2:00-4:00pm
- Tuesday March 15, 4:00-6:00pm
- Tuesday March 15, 6:00-8:00pm
- Other:

31 [demo5]What year in school are you?

Please choose **only one** of the following:

- Freshman
- Sophomore
- Junior
- Senior
- Graduate
- Other

32 [demo6]What is your age?

Please write your answer here:

33 [demo7]What is your gender?

Please choose **only one** of the following:

- Male
- Female
- Other



34 [demo8]Do you consider yourself:

Please choose **all** that apply:

- Black
- White
- Native American
- Pacific Islander
- Asian/Indian
- Other:

35 [demo9]Are you of Hispanic descent?

Please choose **only one** of the following:

- Yes
- No

Thank you for completing this survey. I will contact you as soon as I have chosen the participants who will be invited to complete the next phases of this study.

31.12.1969 – 18:00

Submit your survey.

Thank you for completing this survey.

APPENDIX D  
OBSERVATION FORM

Avatar Name: \_\_\_\_\_ Date: \_\_\_\_\_

Record observed behaviors, chat texts, questions, and spoken questions in the appropriate column below.

Student interest and engagement	Interaction with course materials	Interaction with course elements	Human interaction	Course navigation
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APPENDIX E  
INITIAL FOLLOW UP INTERVIEW FORM

Initial Follow Up Interview Form

Avatar Name: \_\_\_\_\_ Date: \_\_\_\_\_

What was your overall thought about the design of the course?

Probes: did you have trouble navigating through the course?

Additional probes:

Did you find the material easy to understand?

Additional probes:

Did you find any parts of the design distracting?

Additional probes:

Probes: colors? Images? Layout? Organization?

Additional probes:

Did you have any problems with the course?

Additional probes:

How do you think these problems were connected to your dyslexia?

Additional probes:

What did you like about the course?

Additional probes:

What did you dislike about the course?

Additional probes:



What changes would you make to the course?

Additional probes:

APPENDIX F  
SECOND FOLLOW UP INTERVIEW FORM

Second Follow Up Interview Form

Avatar Name: \_\_\_\_\_

Date: \_\_\_\_\_

What kinds of classes do you enjoy the most?

Probes: what do you like about them?

Additional probes: did you always like these classes? If not, what classes did you like and when did you change? What made you change?

What classes do you excel in?

Additional probes: have these always been the classes you excel in? If not, what other classes did you excel in? When did you change?

Do you play video games? If so, what kinds? What are your favorites? If not, why not?

Additional probes: what do you like about these games? What is your usual strategy when playing these games (linear path, explore everything, side quests)?

What classes do you like the least?

Additional probes: why?

What classes do you have the most difficulty with?

Additional probes: why?

Which difficulties associated with your dyslexia are the most challenging to deal with?

Additional probes: how do you think these difficulties affect your classes/grades?

What accommodations have you found most helpful?

Additional probes: do you use your accommodations in all of your classes? If not, how often do you use them? Why don't you use them in all classes?

Have you taken any online courses?

Additional probes: what did you like the most about them? What was the most challenging about them?

What kinds of classes do you think would work in the course design?

Additional probes: why?

APPENDIX G

VIDEO GAME CATEGORIES REPORTED IN SURVEY RESULTS

Game Category	References in Survey Responses
Do not play games	19 (28%)
First Person Shooters( FPS)	17 (25%)
Massively Multiplayer Online (MMO)	12 (18%)
Real Time Strategy (RTS)	12 (18%)
Role Playing Game (RPG)	11 (16%)
Kinect &Wii games	9 (13%)
Puzzle games	9 (13%)
Sports	9 (13%)
Card, dice, board games	7 (10%)
Word games	7 (10%)
Adventure games	6 (9%)
Platform games	6 (9%)
Facebook games	5 (7%)
Iphone games	4 (6%)
Kid games	3 (4%)
Simulations	3 (4%)
Strategy games	2 (3%)
Arcade games	1 (1%)
Cooking games	1 (1%)
Fighting games	1 (1%)
Hidden object games	1 (1%)
Party games	1 (1%)
Turn based strategy games	1 (1%)

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