


1-1-2012

# A higher education case: millennial experience toward learning through a virtual world designed as an authentic learning environment

Marija Franetovic  
*Wayne State University,*

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**A HIGHER EDUCATION CASE: MILLENNIAL EXPERIENCE TOWARD  
LEARNING IN A VIRTUAL WORLD DESIGNED AS  
AN AUTHENTIC LEARNING ENVIRONMENT**

by

**MARIJA FRANETOVIC**

**DISSERTATION**

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of requirements

for the degree of

**DOCTOR OF PHILOSOPHY**

2011

**MAJOR: INSTRUCTIONAL TECHNOLOGY**

Approved by:

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Advisor

Date

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## ACKNOWLEDGEMENTS

I would like to thank my family members, friends, colleagues and acquaintances who have inspired me to complete my Ph.D. I thank each of those people and would like to acknowledge a few with special gratitude. First of all, I would like to thank my best friend and husband Matt Fredericks, my best girlfriend and also my sister Lucija Hrovat, my dear parents Snjezana and Vjekoslav Franetovic. Then, I would like to extend a special thank you to my deceased grandmother Marija Franetovic. I would also like to thank my extended family and friends who always believed in me – Kuzmanic, Milat, Fredericks, Hrovat, Ramirez, Andrakovich, Dixon, and Wolfe and others. Thank you to my colleagues Dr. Robert Stephenson, Dr. Anne-Marie Armstrong, Dr. Pam Lowry and Dr. Alan McCord, and all those who have inspired me, and when needed, told me that ‘I can do it.’ Thank you to my brother-in-law Tom and my friends Melissa, Ashley, Karen, Michelle, Sandy and many others, who had faith in me, were there for me, and were willing to ‘put on hold’ some fun times until I finish this important journey. I especially thank my Advisor Dr. Monica Tracey, my committee members Dr. Tim Spannaus, Dr. James Moseley and Dean Matthew Seeger for guiding me through this process of personal and intellectual growth. I would also like to extend my gratitude to Dr. Karen Tonso, Dr. Bill Warters, and Dr. Jackie Stavros who helped me gain a better understanding of qualitative research. Veronica Beilat and other wonderful librarians helped me in searching through databases for my research. Michele’s patience and sense of humor was much appreciated. I would like to thank the professor in whose course the study took place and especially the study participants. Each of them shared their thoughts and feelings about their

learning experience in an authentic learning environment through a virtual world. Their kindness made it possible for me to explore a small cross-section of this expansive topic.

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## CHAPTER I “Introduction”

### **Background**

Multi-User Virtual Environments (MUVES), or virtual worlds, have been in existence for the last decade. So far primarily utilized for entertainment and commerce, they are increasingly used as environments for higher education. Second Life is perhaps the most popular MUVE (Boulos et al., 2007) at any one time and has the most accounts overall in comparison to other MUVES. There are a number of resources available with suggestions for utilizing MUVES in education. For example, there is the Second Life Education website and the United Kingdom Second Life Open University website, as well as many other in-world teaching and learning resources. Though practical resources exist regarding all that is possible in these environments, ranging from specific applications or in-world tools, to what content MUVES may be used for to technology affordances; the majority are not empirically based to aid in the design of instruction for virtual worlds in higher education (Sanchez, 2007). This is particularly the case when the use of MUVES is coupled with the use of an authentic learning framework for the Millennial generation. This qualitative case study, grounded in instructional design epistemology, explored Millennial student experience with the use of the authentic learning framework within the virtual world of Second Life.

The current economic recession has led higher education e-learning to increase efforts toward marketing and recruiting. In order to stay competitive within the globalization-affected climate, higher educational institutions have been pressured toward creating and offering new online programs, sometimes at the cost of quality improvement of their overall offerings. Online

departments have faced budget cuts, as have other university departments (Schroeder, 2009), and they too have had thinly distribute their support services and resources.

Accredited online programs follow an abridged version of the widespread instructional systems design model ADDIE (analysis, design, development, implementation, evaluation) for course design. However, when squeezed within the scope of the business bottom line, innovation may suffer and lead to a lock-step course design process. Furthermore, the quality of online education as a whole is partially compromised by stand-alone online courses which are offered without accountability to an accreditation agency. In some cases, downloading a set of digitized documents along with rudimentary checks of factual knowledge may be what constitutes the interactivity of an entire online course. In those circumstances, online higher education approaches training, and offers to the student experience what is ostensibly an online filing cabinet.

The same unsympathetic world, which leads online education to streamline and leverage its efforts, uncompromisingly awaits graduates, irrespective of which delivery method they experienced throughout their university career. Incidentally, many graduates find themselves ill-equipped to face the global job market competition or to thrive in today's pressure-cooker work environments. Higher education may underestimate its influence on these outcomes. Perhaps they explain the misalignment of college-graduate skills to employer needs by rationalizing that this is due to today's students' short attention spans, gaming habits, social media (Facebook,

Twitter, etc.) appetites, or poor study habits. Though these may affect student attention and the transfer of knowledge, this case study explores other rationales such as

- new online learning environment options either not considered or circumvented by poorly chosen or not practically implemented ones
- new online learning environments not aligned to appropriate instructional design frameworks, or else either poorly designed or implemented; and
- online learning environments not adequately supporting today's students' complex real-world needs.

The danger of sidestepping innovative online alternatives, perhaps due to resource constraints or else rote practices in instructional technology might eventually adversely affect both the quality of higher education online learning and richness of the learning experience overall. Second Life (SL), a MUVE, provides free accounts and free browser-operated software for everyone. To run, it requires an internet browser and a small downloaded program that may be run off a Flash drive. It also requires an adequate graphics card and hardware, though these considerations are progressively less of an issue. In addition to being a reasonably inexpensive and scalable solution to supplement higher education learning environments, SL may also offer a cost alternative to other virtual learning environments (VLEs).

Second Life offers the opportunity of creating learning experiences which simulate real-world problems. If created appropriately, these learning opportunities may offer relevant job experiences and authentic challenges which approximate real-world jobs. It may also provide students with practice in adapting to new technologies, virtual communication and collaboration

skills, and media literacy, all of which have become day-to-day operations for today's global workforce.

Virtual world environments are non-linear, immersive, and conducive to collaboration (Livingstone & Kemp, 2008) and, as such, may appeal to today's students. Compared to the traditional asynchronous online delivery mechanisms, the 3-D virtual world environment has the possibility of facilitating less of a lock-step instructional design. As a result, there is an opportunity for designing richer and less static student learning experiences.

### **Statement of the Problem**

The work of instructional design may be looked upon as 'sifting' through new technological and strategy changes for that which may be useful for different teaching and learning contexts, and then 'sculpting' ways by which to maximize the potential of these innovations within their context. Eventually, the use of MUVES for blended delivery may lead to a more efficient and effective transfer of learning as compared to results of each delivery mechanism on its own. Merely using virtual worlds, however, is not enough, and should be supported by the creation and facilitation of an aligning instructional design framework.

The degree of parallelism between Second Life and the real-world make it possible for mimicking actual work environments and respective work projects. Use of MUVES such as SL may inspire open, collaborative, critical, and life-long learning mindsets. A virtual world may naturally lend itself to the use of an authentic learning environment framework due to its inherent approximation or simulation of the real-world. Instructional design of an authentic learning

environment complements the networked, post-modern, and uncertain atmosphere of the 21<sup>st</sup> century, an atmosphere which was prophetically put forth in *A Cyborg Manifesto* (Haraway, 1985). There are other fictional works which predict an even farther away future. For example, *Neuromancer* (Gibson, 1984) predicted a virtual world that connects a massive network of avatars, servers, even artificial intelligence, leaving behind all sense of time and human identity as is currently known to us. Here are a few examples of the types of real-world experiences which have already been simulated in a number of different examples through Second Life for learning purposes:

- Students studied and created virtual world ethnographies (Delwiche, 2006).
- Students simulated providing health care to virtual world simulated patients through simulated case studies (Boulos et al., 2007).
- Students built prototypes of interactive learning environments (Good et al., 2008).

There are also authentic context and activity possibilities within MUVES precisely because they are not feasible in the real-world or through alternate media. There is a possibility of designing in-world practice opportunities that are not as resource intensive as they are in the real-world. It can be a safe environment for learning without the constraints of cost, safety, scale relations, or physical reality limitations.

The interaction and immersion possible through MUVES clearly differs from that of traditional asynchronous discussion boards, synchronous virtual conferencing tools, even practice opportunities outside the classroom. Second Life has a unique blend of communication



media, a user-created 3-D environment, embedded tools, a variety of in-world resources, conduciveness to select learning strategies, and other affordances. Albeit all these possibilities, the extent to which higher education in MUVES leads to actual learning will rest upon what instructional design and teaching was used and how, with whom it was employed, and to what extent best practices were studied, implemented, and improved upon.

Studies thus far discussing instructional design for MUVES in higher education could be categorized into those that focused on technical attributes of the medium or an isolated instructional strategy with respect to a particular subject area. The majority of these research studies gathered descriptions or level one student satisfaction evaluations. There was a gap in the literature for suggesting instructional design considerations upon which the respective design of MUVE instruction could be based for today's learners in higher education. This qualitative inquiry sought to understand a holistic student experience of an authentic learning environment within a MUVE through examining matching strategies, today's student needs, and virtual world media effects.

### **Purpose of the Study**

This case study sought to understand today's Millennial student experience toward learning through a virtual world that utilized an authentic learning environment framework. It sought to holistically describe and provide interpretations through a participatory as well as a critical lens. The purpose of the study was to shed light toward best instructional design practices and to ask critical questions about this higher education context. The qualitative study

utilized a single embedded case study design. The units of analysis for research questions one, two and three consisted respectively of the class, the individual, and the team project phases. The research questions were:

- How did Millennial students experience learning in a course facilitated through a 3-D virtual world and designed as an authentic learning environment?
- What unique characteristics did Millennials in a game development course exhibit when learning was facilitated through a virtual world which utilized an authentic learning environment framework?
- How did the virtual world affect Millennial communication, environment development, and collaboration during the lifecycle of a real-world team project?

For research question one, the study examined how students experienced nine authentic learning environment strategies within the virtual world of Second Life. Research questions two and three developed from broader-spectrum initial questions about the learners and about what happens over time during a real-world team project. The emergent nature of the study facilitated the narrowing down of these two questions to more context-specific issues. For research question two, the study identified Millennial types in the game development course according to their perceptions about virtual world learning. Project team leaders who were gamers were observed in depth in order to learn from their successful learning engagement

strategies. Research question three examined virtual world media effects on communication, environment development, and collaboration during the lifecycle of a real-world team project.

### **Theoretical Context**

This research study rests upon three theoretical bases. These include the interpretive paradigm, the authentic learning environment framework, and aspects of critical mass communication theory.

#### **Interpretive paradigm.**

Research questions were examined through the interpretive paradigm. Through this lens, “constructions of individuals and groups are not more or less ‘true’ in an absolute sense, but simply more or less informed and/or sophisticated” (Lincoln & Guba, 1985, p.111). This research study examines “both cognitive and affective” issues (Schensul & LeCompte, 1997, p.49). The report is meant to be more of an interactive dialogue between the researcher and the reader, as opposed to a yes or no assertion or a zealot account of a complex scenario. The rigor of the current study is also due to time-intensive participant research, data-driven and emergent issues’ collection, and the revealing of challenges or potential biases.

#### **Authentic learning environment framework.**

This study was conceptually based on the authentic learning environment framework as applied to designing learning experiences for MUVES. Constructivist philosophy, upon which

authentic learning rests, refers to learner-centered instruction where the learner is seen as constructing knowledge versus one in which the learner acts as a passive receptacle for knowledge (Jonassen, 1991). Jonassen (1999) provided guidelines for designing constructivist learning environments with provisions such as access to multiple perspectives, options for activities and assessments, and access to a variety of content and learning tool resources. Jonassen et al. states that constructivism allows for: “the dynamic nature of learning, emergent properties of thinking, plausible rather than exact reasoning, learning situated in context, and the indeterminism that always seems to subjugate our expectations about learning outcomes (1995, p.8).”

Situated learning refers to learning knowledge and skills in contexts which closely resemble the way knowledge will be used in real-world contexts (Brown et al, 1989). Herrington and Oliver (2000) put forth a comprehensive authentic learning environment framework which comprised of key research findings about situated learning. They applied critical factors from situated learning to the instructional design of a multimedia learning program. These included the following:

- “1. Provide authentic contexts that reflect the way the knowledge will be used in real life.
2. Provide authentic activities.
3. Provide access to expert performances and the modeling of processes.
4. Provide multiple roles and perspectives.
5. Support collaborative construction of knowledge.

6. Promote reflection to enable abstractions to be formed.
7. Promote articulation to enable tacit knowledge to be made explicit.
8. Provide coaching and scaffolding by the teacher at critical times.
9. Provide for authentic assessment of learning within the tasks.” (Herrington & Oliver, 2000, p.5).

**Millennials learning in virtual worlds: a critical perspective.**

The participants in this study were young adult students ages 18-22 enrolled in an introductory game development course. They were a unique subset of the Millennial generation, as the majority were today’s traditional undergraduate students and gamers. Inferring from the typical social media savvy characteristics of the Millennial generation, the students were conjectured to be more interested in learning through a virtual world such as Second Life in comparison to general student audiences.

A critical perspective was applied when exploring diversity or when examining social relationships around authority figures. The researcher’s own balancing of roles was challenging because borders had to be continuously reexamined. It was conjectured that learner perceptions and suggestions for virtual world learning improvement might differ according to their backgrounds. Backgrounds which were considered included majors, familiarity with online gaming, gender and other diverse audiences, learner preferences, and student individual aptitude in computer science, communication and art. Turkle’s seminal work (1997) provided insights into critically examining the many facets of the virtual persona. The current study also explored

virtual world media effects upon communication, environment development, and collaboration with respect to learning.

This was a unique subset of Millennial learners because the majority were gamers. It was presumed that the students were interested in a behind-the-scenes understanding of a successful game by virtue of choosing an introductory game development course. In order to gather insights on how to create more engaging and meaningful learning experiences through the lens of a Millennial gamer, the study illuminated their characteristics, perceptions, and challenges. Additionally, it sought to identify factors which might enhance learning engagement within a MUVE in order to further inform how to enhance instructional design for MUVEs.

### **Definitions of Key Terms**

**Instructional design.** The theory and practice which consists of the science and art of creating detailed specifications for the development, evaluation and maintenance of situations which facilitate learning and performance (Richey, Klein & Tracey, 2011).

**Technology integration** (sometimes referred to as social media integration). Learning integrated ‘in’ technology as opposed to previous viewpoints of technology, in which students learned ‘about’ technology, ‘from’ technology, or ‘with’ technology (Schrader, 2008). Within this view of technology integration, Schrader (2008) explains: “the educator no longer delivers instruction....rather they create the circumstances by which students engage in learning.”

**Millennials** (sometimes addressed as the Net generation). The Millennial generation refers to young adults between the ages of 18-29. Millennials make up approximately 50 million of today's population, many of whom were born to the Baby Boomer generation. They are active users of new technologies; for example, 75% of them use social networking sites (Taylor & Keeter, 2010). The Pew Research Study (Taylor & Keeter, 2010) also found the majority liberal and concerned about environment issues.

**Online learning** (sometimes referred to as e-learning or distance learning). In this study, online learning adopted the ASTD definition, which describes it as education which is facilitated and supported via information and communications technology (ICT). ASTD states that e-learning is:

a broad set of applications and processes which include web-based learning, computer-based learning, virtual classrooms, and digital media. Much of this is delivered via the Internet, intranet, audio and videotape, satellite broadcast, interactive TV, and CD-ROM. The definition of e-learning varies depending on the organization and how it is used, but basically it involves electronic means of communication, education, and training.

**Virtual world.** (sometimes referred to as Multi-User Virtual Environment or MUVE). A persistent and shared 3-D virtual environment which is accessed over the Internet and allows numerous users to interact synchronously or asynchronously, continuously updating the 3-D

graphical interface and the avatars the users embody. Common uses include 3-D virtual product or simulation design, marketing and sales, virtual meetings, and entertainment.

In a MUVE, human-computer interaction takes place between users on workstations connected through the Internet. The users represent their virtual identities by a 3-D individually-created entity, or what is referred to as an 'avatar'. The avatar's state is kept up-to-date by keyboard input, mouse manipulation, and other multi-modal inputs. Using their avatars as embodiments of the self, users modify their avatars, interact with other users, interact with non-player computer characters (NPCs), or modify and move through the 3-D environment. The entire 3-D graphical interface is continuously updated or rendered, which is seen as 'rezzing' with respect to the user's position and inputs.

**Second Life (SL).** MUVE that is free, client-based, and approximates the real-world by creating an immersive simulation of it. When in-world, the user may take on either a 1<sup>st</sup> person or a 3<sup>rd</sup> person viewpoint or alternately use the in-world camera view. Though SL is by no means the only MUVE at this time, it has the largest user base, is the most developed, and is still unique due to its own real-world economy and currency (The Linden dollar). It may be said that SL even has its own history from its inception in 2003 up until now. All avatars and the entire Second Life virtual world are designed by its users. On average users spend 125 hours in-world, and SL revenue equals about 125 million US dollars per quarter (Second Life, 2009).

As this MUVE mirrors real life in its entirety, one of its many uses includes e-learning. Many educational institutions have purchased server space from *Linden Lab*, the



company which owns Second Life. The server space in turn translates to virtual land which is then developed into virtual world campuses, admissions offices, libraries, and classrooms.

**Constructivism.** A philosophy, with a central focus on the learner. The learner is seen as constructing knowledge versus acting as a passive receptacle for it (Jonassen, 1991).

**Situated learning.** (used synonymously with authentic learning in this study). Refers to learning knowledge and skills in contexts which closely resemble the way knowledge will be used in real-world contexts (Brown et al., 1989).

**Ill-structured problems** (used synonymously with real-world project in this study). Learning that results from the process of working toward the understanding or resolution of a problem. Ill-structured is a type of problem-based learning which is more open-ended, often consisting of real-world problems (Jonassen, 2000).

## **Chapter Summary**

In this chapter, the problem was introduced in broader terms as it relates to online learning, then the problem was further elaborated upon, connecting it to the purpose of the study and the research questions which were posed. Subsequently, the theoretical bases for the study were highlighted and the key terms used in the study defined.

The literature review chapter which follows describes the net or Millennial generation learner in relation to a virtual world such as Second Life. Learning and instructional design

theoretical foundations for choosing an authentic learning environment framework for use with a MUVE are explained. Instructional design best practices are gathered from environments which have attributes similar to those found within MUVES. This is followed by uses of Second Life in traditional higher education. Finally, studies that approach the use of authentic learning precepts, such as the use of real-world problems or problem based learning are presented.

## CHAPTER II “Literature Review”

This literature review discusses Millennials, authentic learning environments, virtual environments with attributes similar to Second Life (SL), applications of SL in higher education, and of authentic learning environments use through SL. There is not an abundance of empirical studies on instructional design for the virtual world of Second Life with the Millennial generation, especially for the subset of the generation which includes gamers. Hence, this literature review also draws upon lessons learned from the use of closely-related environments such as other virtual worlds, virtual reality, microworlds, and massively multi-user online games (MMOGs). Furthermore, there is no extant empirical research in higher education which explores the unique cross-section between the authentic learning environment framework and the virtual world of Second Life as used by Millennials. Empirical studies using Second Life in higher education are reviewed, followed by studies in SL that more explicitly support authentic learning environments.

### **Background**

Second Life is a multi-user virtual environment (MUVE), or virtual world, with its own culture and economy. All of the 3-D avatars and the entire Second Life virtual environment are designed by its users, referred to as residents. Though online games with 3-D environments have been around since 1978, Second Life has been in existence for only six years at the time of this study (2009). This immersive 3-D virtual world has more than 7 million accounts, over 700,000 active users, and may generate revenues of approximately 1 million real-world dollars per day (Perkins, 2007). Though it is just one of the many virtual worlds available, it nevertheless has

the largest and most active user base in comparison to other virtual worlds. As such, SL recreates a most lifelike simulated environment. It is within a course facilitated through this environment that the current study took place.

### **Millennials: Possibilities for Learning through the Virtual World of Second Life**

The Millennial generation refers to those who currently fall between the ages of 18-29. Millennials make up approximately 50 million of today's population and are known for being active users of new technologies. For example, 75% of Millennials use social networking sites (Taylor & Keeter, 2010). As an example of the pervasiveness of technology in this generation's lives, 83% said they sleep with their cell phone nearby (Taylor & Keeter, 2010). A record number of Millennials is unemployed and in college - on their way to becoming the most educated generation in our history (Taylor & Keeter, 2010).

Sanchez (2007) calls for more evidence-based research toward educational best practices with virtual worlds. Considering today's learners and their high-tech tools, Wilson's (2005) encompassing definition of instructional design may be considered: "how to design and deliver good learning experiences for learners in a variety of contexts and, secondarily, how to best use various technologies in the service of learning" (p. 248). For example, an instructional design need may involve an online course with the goal of enhancing critical thinking and creativity. In such a scenario, would it be best to a) design a linear course within a largely static learning management system using the traditional instructional design ADDIE model, or b) design an immersive course using the affordances of a MUVE such as Second Life within an appropriate instructional design approach? MUVEs such as SL mirror reality by having a highly ill-defined

non-linear structure with random access points which embody exploratory 3-D online spaces. Their educational attributes differ from asynchronous online and face-to-face instruction. The discussion which follows explores instructional design theories and corresponding research studies using SL and similar environments and provides insights into instructional design best practices.

**SL mirroring the real-world: Opportunity for media literacy and virtual skills.**

Second Life and virtual world competitors have been described as the next evolutionary phase of the Internet (Fitzgerald, 2007). The IT research company Gartner had estimated that 80% of active online users will participate in virtual world environments by 2011 (Oishi, 2007). Depending on implementation practices, technical requirements and the cost of virtual world real estate, there is some concern of an expanding divide between “the haves” and “the have nots.”

In SL, the two halves may be divided into those that have a more permanent place in the virtual world and those that might be viewed by Second Life residents as mere casual tourists (Hayes, 2006). SL residents may demonstrate their belonging by ownership of custom-made avatars, elaborate wardrobe, buildings and assets, and by their overall sense of belonging to virtual world communities.

Second Life currency, the Linden dollar, has increasingly appreciated along with the European Euro, while the American dollar has continued to depreciate (Brown et al., 2008). Prominent companies such as Sun, Dell, British Petroleum and Intel inhabit Second Life to collaborate, market research, prototype products, advertise, and sell products and services in an

actualized revenue-generating environment. Hence, this virtual world attribute of SL adds to the authenticity of its environment.

### **Selection of SL for Millennials to match their social media preferences.**

One way to characterize Millennial learner preferences is by the technology tools they use and how pervasively they use them. According to a student group research project, the tools used by today's learners differ from traditional educational tools such as books, white boards, and learning management systems. The average student today uses technology as follows

- 74% watch videos online;
- 56% download music online; and
- 43% play online games.

For research, the average student today uses technology as follows

- 91% search for answers online;
- 70% research online; and
- 67% read news online.

For collaboration, the average student today uses technology as follows

- 89% email;
- 64% Instant Message; and
- 60% text message (Robbins, 2007).

Cognitive research identifies today's learners as favoring visual, psychomotor and participatory learning preferences, as well as characterizes them by short attention spans (Newcart in Perini,

2007). Schrader (2008) presents the current view of technology as integral to today's learners' everyday lives.

### **SL access to multiple perspectives: Facilitating diverse learner interactions.**

The social fabric of Second Life is inextricable from what it is, as users themselves created it. In comparison to other 3-D environments with set choices and default avatars, SL is almost entirely customizable. It allows for unique individual expression through avatars and choice of surroundings. Regarding user population, the average age of SL inhabitants is 30. Internationally, Europe is represented at 60% and US at 16%, while in terms of gender there are 60% men and 40% women, out of whom 20% are men posing as women (Robbins, 2007).

Barab et al. (2005) addressed issues of gender within 3-D environments of online games, summarizing that there were very few titles for women, women were underrepresented within online games, and when present they were represented in a stereotypical fashion. The diversity of Second Life might provide an environment that approximates the real-world more realistically than do online games. It also may be more realistic compared to other virtual worlds in mirroring real-world demographics.

### **Instructional Design focused on Learner-Centered Instruction**

#### **Motivation.**

ARCS is a learner-centered instructional design model developed by John Keller (1987) that focuses on motivation. Its four attributes, attention, relevance, confidence and satisfaction, are adjusted for learners in order to enhance chances of motivation to complete learning goals (Keller, 1987). When the ARCS motivation model was applied to distance education, it was

revealed that it may positively influence learning (Visser et al., 2000). The 'R' component of the ARCS model, which stands for 'relevance,' is germane to the current study because authentic learning projects are often relevant to student lives and their future careers.

A second lens for viewing motivation is the phenomenon termed 'flow' by Csikszentmihalyi (1990) - a state of enjoyment gamers often attain when they play for hours on end immersing themselves in a game, perhaps even forgetting time. It is not the relative ease or comfort, even fun, with which an activity is performed that makes it enjoyable; rather, it is the ability of the activity to capture the learner's interest in such a way that he or she is continuously challenged. The sense of happiness and engagement this creates is characterized by a continuous 'flow' of positive feedback in personal accomplishment and growth. Spiegelman and Glass (2008) recommended motivating the Millennial learner by using strategies that are inherent in online games.

### **Mental models.**

Mental models, which stem from cognitive learning theory, describe how learners conceive of a domain of knowledge which may be highly individualized, layered, and fragmentary (Winn, 2004). These become learner strategies for assimilating new information into old, thus creating personal representations of the world. Virtual worlds may enable learners to create explicit representations of their mental models and may also allow them to experience and evaluate diverse mental models of others. One study found a significantly enhanced sense of online telepresence through the use of avatars (Qiu & Benbasat, 2005).



Beyond a mere presence, avatars have the capability to fluctuate between multiple identities and multiple viewpoints (first person, second person, camera view), and co-exist in an omnipresent state (Turkle, 1997). For example, traveling (teleporting in SL) to what may seem a distant place in the real-world may be accomplished with the ease of a single click on a landmark. SL does not simply mirror the world we live in; it also represents the worlds of our collective imaginations. SL residents may visit places they would otherwise never have visited, do daring things they might have never done, and create multiple customized representations of their identity, the world, and the realms of their imaginations, all within one shared and persistent online 3-D environment. SL's look and feel directly represents the post-modern cyborg culture and world of its inhabitants (Cheal, 2007).

Since learners have unique sets of prior knowledge and experience, abilities, beliefs and culture, some instructional design methods miss adequate alignment to their needs for grasping new knowledge. The intrinsic nature of the SL environment enables the use of mental models that match the personal needs of a learner. For example, if a simulation is created in SL which matches components of the learner's mental model, the learner may connect to the familiar components found in the simulation, using it as a basis for further connections.

One cognitive visualization study by Merickel in 1991 (McLellan, 1994) used virtual reality in a similar way one might use a MUVE to help students solve spatial problems and thus increase their cognitive skills. Twenty three subjects were split into experimental and control groups. After the second try, the subjects had no problems traveling inside computers, manipulating objects, and flying from place to place. However, the results of the study were

inconclusive regarding correlation between the ability to mentally manipulate objects and developing spatial problem-solving skills. This could have been the result of small sample size or inadequate variable control. Nevertheless, the researcher commented on the relatively short time needed for students to become comfortable within the environment, expressed promise for instructional techniques using virtual visualization, and recommended further research.

### **Constructivism and authentic learning environments.**

Jonnasen (1991) explains that instruction based on pure objectivism assumes that once instruction is over, all learners have obtained the same understanding. He explains constructivism, stressing that the same understanding does not necessarily follow, especially if all learners have different mental frameworks. In constructivism, which was first introduced by Piaget in the beginning of the 20<sup>th</sup> century, learners construct knowledge by interacting with their environments.

Presenting static PowerPoint presentations in SL probably would not make for an optimal use of SL's instructional affordances. SL instructional design might benefit from Jonnasen's (1999) guidelines for creating constructivist learning environments. Facilitator strategies of modeling, coaching, and scaffolding are recommended for moderating instruction in such environments. A variety of course-related learning resources should be used, such as embedded websites and learning objects in addition to instructional tools. Various communication, collaboration, and development tools are integral affordances of the Second Life technology platform. Two examples of SL communication tools are chat and voice tools.

Social constructivism in its most essential form is described as learning from others. It is characterized by knowledge construction via multiple perspectives and the understanding of knowledge with multiple perspectives in mind (Vygotsky, 1978). Learning activities rooted in social constructivism rely on social interaction and negotiation within natural contexts. Social constructivism (Vygotsky's cultural-historical psychology) influenced constructivist-based strategies for both situated learning (Brown et al., 1989) and activity learning theory (Barab et al., 2004). The extent to which instruction has been designed to match the learner's actual contextual environment affects learning and subsequent abilities to find new knowledge readily transferable in the subsequent course, job, or situation (Brown et al., 1989). The following are recommendations for activities influenced by this epistemology

- facilitator support for active learning;
- provision of instructional materials for student collaboration;
- attention to the zone of proximal development (just-in-time learner guidance);
- exposure to a variety of tools; and
- student evaluations based on understanding (Brown et al., 1989).

MUVEs and similar learning environments may allow learners to experience seeing, thinking, and practicing in a world that simulates real life as closely as possible. As a result, learners are given the opportunity to participate versus being treated as mere loading docks for knowledge delivered via packages of PowerPoint notes and online training modules. The SL learner experience is analogous to being an apprentice; a learner may design, collaborate, create and develop, in a manner that approximates real life. For certain topics, instructional design may

even include simulations which demonstrate or provide experiences not even possible in real life. SL multi-modal communication is a far more realistic representation of the world we inhabit in comparison to commonly used asynchronous environments, which primarily rely on text-based discussion boards or associated video conferencing tools that are also limited by their functionality and rigid interfaces.

The fact that SL is a self-represented multi-cultural community within a constantly changing simulated environment all contributes to its high degree of realism. This also makes SL compatible with activity learning theory. In parallel, an environment using activity learning theory is complex and in a continual state of flux (Barab et al., 2004). SL's spatial learning environment is entirely different from most traditionally designed sequenced instruction (LaChapelle, 2007). However, perhaps due to being an emerging technology, it may also pose a challenge in terms of its integration with learners, educators, instructional designers, information technology experts, and administration.

### **Education in Environments that have Attributes Similar to Virtual Worlds**

MUVEs may be particularly favorable to constructivist learning environments. Instruction in MUVEs may be designed wholly immersive through maximizing multi-modal communication and non-linear options for social and contextual interactions. Furthermore, the 3-D nature of the environment may increase presence, and with it lessen the feeling of distance and isolation that may exist in other virtual environments.

Oppositions exist toward treating computer-mediated instruction as authentic learning environments. Rationales include that computer-mediated instruction is not physically real and

that no type of abstract learning may replace learning by doing in the actual setting. McLellan (1994) addresses these concerns by explaining that even though situated learning calls for a real context, this may also be accomplished either through a work setting, a realistic simulation, or an anchoring context such as a multimedia program. Another opposition to using MUVES in higher education includes a concern that the environment does not provide for enough inherent linkages between technological and social systems, rendering it not easy to use and leading to difficulties in attaining adequate social interaction (Sanchez, 2007). Bartle (1994) states that as with any technology, there are virtual world affordances as well as possible complications.

Lessons for MUVE instructional design may be inferred from environments that have similar attributes. Environments discussed here tend toward learner-centered pedagogical orientations. Microworlds are similar because they are mini simulations and recreations of a mini world. Massively-multi-user online games (MMOGs) are similar because of their immersive qualities, 3-D virtual world persistence, and the use of avatars. For example, studies such as Rieber (2005) on microworlds, Barab et al. (2005) on Quest Atlantis with a MMOG-like virtual world, and Dickey (1995) on Active Worlds with a simulation-like virtual world all provide their own instructional design guidelines.



have an embedded online game (VWQ2 in Figure 2.1), it may have an embedded simulation (VWQ1 in Figure 2.1), or it may be used for specific tasks (VWQ4 in Figure 2.1).

### **Virtual reality.**

In one virtual learning environment case study a cell biology virtual world was used with an experiential learning approach. Students built simulations of human cells to learn about cell biology and then furthered their understanding through interacting within the simulations (Grschler in McLellan, 1994). Students visually created cells in 3-D on the computer screen, modified them, and were then able to observe them from different angles. This gave them an opportunity to inspect the human cells on a much larger scale than would have been the case using a microscope, and to view them through more perspectives than possible in 2-D. Student observations included concepts such as how the mitochondria powers the muscle cells. There were two groups in the study; the experimental group used virtual reality while the control group used traditional desktop methods. The results of the study found the latter retaining more cognitive information. The experimental group might have been more accustomed to traditional types of learning, less experienced with virtual reality, or distracted from instructional goals. However, the research study also found that students who created a world reported a rich learning experience and spent more time on task; they were immersed by being able to interact with newly formed concepts. More research about open-ended, informal, and incidental learning experiences was recommended.

According to Bricken, 3-D virtual environments afford the opportunity to create objects and move in a 3-D space quite easily without programming knowledge; all that is required is

basic academic and thinking skills, and basic computer capabilities (McLellan 1994). She also notes that these environments are unique as they offer a developmentally flexible and interdisciplinary environment for individual learning preferences. Discernment is made between the old desktop paradigm, with the learner as an observer viewing an interface, and the virtual-paradigm, through which the learner is a true multi-modal participant interacting within the technology for learning (McLellan, 1994).

### **Microworlds and simulations.**

Empirical studies discussing microworlds may illuminate the study of instructional design for virtual worlds because of their functional similarity in simulating an experience, in this case, within a contained context. Rieber (2005) explains microworlds as exploratory constructivist-based mini virtual worlds that are based on invention, play, and discovery. He describes the concept of exploratory learning as independent, diverse approaches to multi-dimensional knowledge, within an uncontrived environment. Through the use of microworlds, technology enables the learner to represent knowledge and to experience working with new concepts. Thus, microworld use enables closing the gap between learning science, doing science, and thinking science (Rieber, 2005). Recommendations for enhancing microworld exploratory learning, and by extension that of learning in a MUVE, include: providing flexibility, adequate time, ample resources, and embedded support (Rieber, 2005).

Rieber (1992) proposed that due to their properties, microworlds provide a venue for bridging direct instruction and constructivism. By being confined to only one domain of knowledge and creating a goal-oriented environment which encourages discovery and



exploration, the best of both approaches may be actualized. Nonetheless, one major difference between a microworld and a MUVE is that the latter does not focus on only one domain of knowledge. This is not to say that a MUVE is incapable of focusing on one domain of knowledge; this would depend on the objectives, instructional design and amount of structure. For example, a science lab experiment focused on one domain of knowledge may be designed within a MUVE. Thus, the idea of the microworld synthesis of direct instruction and constructivism may be applied to virtual worlds on a case-by-case basis. Recommendations for instructional design for computer-based microworlds include creating

- “1) a meaningful learning context;
- 2) knowledge building from known to unknown;
- 3) provisions for a balance between deductive and inductive learning;
- 4) flexibility and stress on the usefulness of errors; and
- 5) provisions for a supportive environment, with readiness for incidental learning”

(Rieber, 2005).

### **MMOGs (massively multi-player online games).**

Due to similarities between MUVE and MMOG environments, best practices from online gaming for education may also inform instructional design for virtual worlds. Van Eck (2006) points out the prevalence of successful studies in which games promote learning and reduce instructional time in many disciplines. It is worth noting, however, that there are a few caveats which differentiate MMOGs from virtual worlds (MUVEs). Commercially popular MMOGs (massively multi-player online games) have restricted structures and generally pre-defined goals

and their main focus is usually action and warfare. As such, they are not easily adapted to a variety of educational purposes.

The benefit of learning from personal trial and error is an opportunity available within the context of an MUV, an MMOG and other virtual environments. One case study was rooted in situated learning and it showcased a virtual environment conducive for learning programming, self-expression, and collaborative learning. He claimed that learning skills such as programming may provide individuals with a greater sense of self-efficacy within a modern information-based society. For example, a research participant reported satisfaction derived from self-expression and from the convenience of calling upon just-in-time expertise in a safe environment (Bruckman, 1994).

Even though freedom and choice abound in Second Life, that same freedom may lead to extremes such as disruptive behavior. At times it may be used for social activism activities such as the re-enactment of the Boston Tea Party to stop SL taxation (Hayes, 2006). It may also lead to disruptive incidents such as the blowing up of virtual establishments by terrorist organizations. The SL experience may vary in many ways on a continuum of

- a genuine sense of self and social respect compared to a contrived one;
- rich interaction with the environment and its residents as compared to a feeling of utter isolation; and
- collaboration with many as compared to collaboration with a select few or no one at all.

Imposed goal-driven actions may not be readily apparent in Second Life. However, simulated life has its own organic boundaries which are challenging in their own way and may lead toward goal-oriented situations. Though there is not a lot of structure, as inherent in some MMOGs, there may be a structure that exists based on its own SL virtual culture. The cultural boundaries are created by SL's Linden Dollar economy, virtual law, and the social norms that exist within SL itself.

A study exploring the multi-user virtual game Quest Atlantis was designed for educational purposes using activity theory. Resulting recommendations were for strategies encouraging community-building, social learning, engagement, relevancy, and alternative methods of assessment (Barab et al., 2005). The concept of 'fun' was employed towards student motivation and educational goals. Students were assessed via portfolios, an authentic demonstration of learning as compared to typically used standardized multiple-choice tests. Example assessments included production of advocacy media and creation of real-world action plans. The gains from this international 30-month period qualitative study by ten researchers produced "statistically significant learning over time in areas of science and social studies, and a sense of academic efficacy" (Barab et al., 2005).

Since the instructional design for the Barab et al. (2005) study was part of a large scale contextual social system which was continuously changing, the recommendations were local to each of the research environments. However, after prolonged and continued collaboration between the ten research environments, common themes did emerge, including the encouragement of

- self-expression;
- self-efficacy;
- an appreciation for multiple world views, social and environmental; responsibilities and health awareness; and
- confidence in functioning within the real-world (Barab et al., 2005).

These findings could inform successful instructional strategies in SL, especially because Quest Atlantis is specifically an educational context and uses the activity theory paradigm.

A qualitative study by Land and Hannafin (1996), also rooted in activity theory, utilized an open-ended learning environment. It explored the process by which learners build models of understanding on a micro level so that they may generalize them to the macro level. It was found that the processes could be synthesized into three main categories

- “1) decisions on how to use the system;
- 2) processing of system-generated feedback; and
- 3) intentions for further action” (Land & Hannafin, 1996).

Though most games have built-in feedback, for a virtual world this depends on its affordances and the design for its use. If SL instruction is implemented without feedback learners might not know if they are on the right track, they might not be motivated to continue, or they may experience a feeling of isolation. Even though this study used situated learning, often suggested for knowledge transfer, there were a few discrepancies. Some learners had incorrect or inadequate breadth of pre-requisite knowledge required to interpret new knowledge, some

over-relied upon visual cues, and some were either not prepared or not flexible enough to reevaluate their mistaken conclusions (Land & Hannafin, 1996).

The above study, notwithstanding a small sample size, is noteworthy in pointing out a few implications for instructional designers in the open-ended learning environment of SL. First, situated learning requires a certain amount of pre-requisite knowledge and an instructor's facility in recognizing the need for further guidance. Secondly, in a world with many visuals, visual cues or lack thereof may be misleading. Hence, SL instructional design should pay particular attention to message design and visual literacy. Visual literacy, the ability to interpret and create visual symbols, is an integral component of language, communication, and ultimately learning (Seels, 1993). Third, when the construction of mental models results in misconceptions, students may not only need additional guidance, but also a focus on the development of their learning strategies. Surmising from Land and Hannafin (1996), not only the use of a particular technology determines the opportunity for optimal learning environments, quality facilitation skills and thoughtfully implemented instructional design need to be coupled for learning to occur.

Effective educational gaming means finding the right balance of instructional design and game-based design principles. There is a number of current books available from the educational perspective such as Gee's (2003) *What video games have to teach us about learning and literacy* and Prensky's (2005) *Digital-Game Based Learning*. On the other hand, works from the gaming perspective such *Rules of Play* (Salen & Zimmerman, 2003) focus on game design elements such as how to embed play, challenge, curiosity, and control into games.

Accordingly, how does instructional design tease out those components of game-play that optimize learning, yet not diminish the intrinsic play that enables the phenomenon of ‘flow’ or motivation?

To some extent, Gee (2003) contextualizes gaming as that which may by itself prepare students for life. According to Gee (2005), a state of the art instructional video game would: “pick its domain of authentic professionalism well, intelligently select the skills and knowledge to be distributed, build in a related value system as integral to game play, and clearly relate any explicit instructions to specific contexts and situations.” Thus, game effectiveness lies not in the fact that it is a game, but in what it embodies, and by extension what it allows its players to do in terms of active, exciting, and empowering options. Prensky (2005) states that: “Ironically, creating engagement is not about those fancy, expensive graphics but rather ideas” (p. 64). Dickey (2005b) interprets implications of gaming variables for instructional design, such as player positioning, narrative, and interactive design (setting, roles and characters, actions, feedback and affordances).

A study by Van Eck and Dempsey (2002) rooted within anchored instruction, examined select game variables and their effects on the transfer of learning. In anchored instruction, the learning environment or activity approaches what one might experience in an authentic apprenticeship and the instruction contextualized within a problem or case study (The Cognition and Technology Group at Vanderbilt, 1990). The use of anchored instruction strategies engages learners by using relevant real-world problems, and ideally, an ease of transferability follows. In the study, ‘competition’ scored higher for transferability in comparison to ‘no competition’. It

was also found that ‘contextualized advisement’ worked partially better in non-competitive scenarios, whereas it had an inverse affect in competitive scenarios.

### **Use of Second Life Virtual World in Higher Education**

Recent research on MUVES in higher education typically falls into four categories. These include new media integration, discipline-specific applications, strategies for teaching and learning, and instructional design and learning. The following section provides a few examples for each of the categories.

#### **New media integration.**

The first category deals with technical and pragmatic considerations for implementing SL. A review (Westmoreland et al., 2009) examines whether education should employ SL by examining the early adopters’ experiences. The suggestions are mixed and dependent on the situation. Leonard et al. (2011) answer questions such as how to best introduce the technology and how to make it function better. Their suggestions point to resources to start with and practical recommendations. For example, they suggested a few training sessions prior to implementation. Within this category of research studies, there are also comparison studies of how one modality differs from the other, which also leads to implementation recommendations. For example, Bender (2007) made recommendations for role-play in online environments, whereas Cohen et al. (2008) focused on recommendations for role-play in virtual environments and simulations.

Cheal (2007) dismisses instrumentalist and determinist claims in reference to SL, referring to them as traps that have always existed and will continue to do so for new

technologies. SL is situated within the post-modern milieu of current instruction in relation to a historical trajectory of teaching methods and instructional design theories. SL's relevancy for the younger generations and learning is noted. She states: "The point is that virtual worlds facilitate experiential, active learning and that is what is needed from instructional technology now" (Cheal, 2007).

### **Discipline-specific applications.**

The above studies primarily deal with technology integration; however, some of the other studies are primarily focused on pragmatic uses of SL for a particular discipline. Commonly represented disciplines within SL are English (Alvarez, 2006; Sullivan, 2009), business (Shen & Eder, 2009; Wood et al., 2009), and health sciences (Boulos et al., 2009).

A self-study of SL in English by Sullivan (2009) points out that there is sometimes a mistaken assumption that just because an emerging technology such as SL will be used, students will receive it favorably or have up-to-date knowledge about the use of that technology. Students in the study were underwhelmed when the environment did not feel like a game, even though it had a game-like appearance. The researcher utilized student feedback to iteratively modify the course design and the activities in order to continuously improve the course. In the end, students reported more meaningful learning experiences (Sullivan, 2009).

### **Strategies for teaching and learning.**

The third category of studies is concerned with very specific teaching or learning strategies. Two recent studies, one exploring project-based learning in SL (Jarmon et al., 2008), and another using SL to facilitate transferable skills (Brown et al., 2008) indicated that the



students did not see the value in using SL. The first of these was a graduate course and the second included adult learners. It is possible that these older generations did not have a familiarity or an affinity for the new medium. Both studies recommended that learners be made aware as to why they are using SL in connection to the course objectives (Jarmon et al., 2008; Brown et al., 2008). In Wood et al. (2009), student production and marketing of products was facilitated through SL for a marketing course. The outcome resulted in student engagement and student reports of enhanced motivation (Wood et al., 2009).

### **Instructional design and learning.**

In the fourth category, studies dealt with learning and instructional design theory for Second Life and other MUVES (Mansour et al., 2009; Jarmon et al., 2009). Mansour et al. (2009) specified strategies from collaborative learning theory for use within MUVES. A recent study (Jarmon et. al, 2009) examined the nature of project-based activities and associated assessments in MUVES for a graduate course of approximately half a dozen students. It was recommended that there is also a need to explore project-based activities and assessments in MUVES with undergraduate courses and courses with a larger student body (Jarmon et. al, 2009). A number of studies in Second Life used authentic or situated learning as a general framework (Brown et al., 2008; Delwiche, 2006; Hayes, 2006; Stevens, 2006). Due to their similarity to the current study's learning and instructional design theory framework, studies such as these were most useful for comparison throughout this research study.

### **Real-world Learning in Higher Education through Second Life**

The ways in which SL may be used in education to create authentic learning, or what is commonly referred to as ‘learning by doing’, are subdivided by Gronstedt (2007) into simulations, hard skills, and soft skills. Simulations may be created for learning with objects, environments and situations which are otherwise impossible, difficult, and/or costly to create in real life. Hard skills involve the more technical aspects of learning, such as designing a prototype or constructing an exhibit piece, but also creation of virtual commodities for self-expression or marketing. Soft skills refer to communication and collaboration among SL residents and a variety of communities of practice. Soft skills examples include learning activities such as role-play, performance, and business negotiations. SL is complex and multi-faceted in its potential for learning. In comparison to online games such as Everquest (Delwiche, 2006), SL is easier and less expensive to use. With moderate computer skills, learners may experience simulations, build simple objects using hard skills, and collaborate within a rich virtual community through the use of soft skills.

#### **Learning via simulations through the use of SL virtual world.**

Simulations in SL allow for a simulated experience and manipulation of physical or other phenomena. At the University of California, psychology students were given the opportunity to experience a hallucination simulation, thus learning through experience about the mental illness of schizophrenia (Conklin, 2007). Simulations may also be created to distort actual scale and perspective. For instance, students may ride an actual balloon and learn about weather in the solar system or walk inside a giant cell.

Another approach for simulations is facilitating a social simulation, one which is less technical. Delwiche (2006) facilitated an SL ethnography project for a class of 36 undergraduate students over the course of a semester. He explained that the aim of the situated learning-based study was to use the SL medium optimally through immersion in the virtual world community. This allowed learners to apply the basics of social research and to foster critical thinking about evaluating research. The study's research methods included synthesized interviews, weblogs, surveys, etc. The students could progressively move from novice to expert levels and have different levels of interdependence. The SL environment was beneficial for teaching problem-solving skills. The students engaged in the simulated practice of being a researcher while being immersed in a virtual world which approximated real-world research.

One of Delwiche's students published a mini-ethnography on the web (Alvarez, 2006) demonstrating an example of learning transfer to real-world practices. A small sample of teachers and players of virtual games were interviewed about their opinions on playing for educational purposes. The work extended beyond the classroom and ethnography skills were practiced, such as quoting a player that was interviewed. The player shared that his attention deficit disorder had interfered with his performance in regular classroom environments, but he believed the virtual environment would make him feel more comfortable in school. In another example, these environments were conducive in helping individuals with agoraphobia disability, a type of social anxiety. This participant reported becoming progressively more at ease in real life social situations due to what he was able to experience through the 3-D interactive environment (Alvarez, 2006). There have also been accounts on the use of thought-controlled

avatars for paralyzed patients in order to simulate action and physical motion (Foster, 2007). Alvarez (2006) recommended that further research explore SL's role for those who are physically and mentally disabled. The study serves as an example of authentic learning and as a demonstration of the type of higher-order learning possible in Second Life.

### **Acquiring hard skills through the use of SL virtual world.**

Hard skills or creation in SL are considered by some Second Lifers as more sophisticated when compared to simple skills exhibited by those who are solely socializing (Hayes, 2006). While anyone may customize their avatar and produce just about anything in Second Life, the life of the product usually depends on how many people actually find it aesthetic, usable, or enjoyable. Students in graphic design, multimedia, interior design, architecture, etc. are able to hone their creative and 3-D technical design skills in MUVES to design virtual identity skins, fashion, uniquely programmed character animations and games, buildings, lofts and entire cities, landscapes and environmental systems. They can also prototype and display their work in the virtual world, eventually integrating it into the real-world. In one SL example, a company constructed a hotel prototype and used it to gather feedback from real-world potential visitors (Linden Labs, 2007). The hotel design, which was influenced by user preferences, might have increased user buy-in.

A game theory and design course was taught in SL with 15 students (Delwiche, 2006). The study was based on situated cognition strategies. In this example, the use of hard skills referred to avatar modification, creation of 3-D objects and environments, etc. The classroom was set up to allow student exposure to major tenets of game theory in order to provide them

with the necessary background knowledge. They were then required to critically analyze concepts and build games of their own in groups. The students explored critical game theorists, raising questions related to game identity, community, technology roles, etc. At the same time, they collaborated with one another on narrative development, 3-D modeling, avatar customization, and action-scripting to build games. Students reported that learning occurred, which was corroborated in the assessment of their game projects. The SL medium was used to integrate new game theory knowledge and link to the professional practice of being a game-designer. The skills and knowledge amassed overlapped communities of practice where “context is crucial” (Delwiche, 2006, p. 169). In yet another example of a higher education course in S L, students created a nutrition game that was educational and highly interactive (Cooper, 2007).

Sanchez (2007) observed that there were many studies about the educational possibilities of the SL environment based on its match to constructivist strategies; however, he pointed out a need for empirical educational studies from SL uses in order to illuminate best practices. His pilot SL course was created to help students visualize the writing process. Despite being a topic in the humanities, this was still grouped mainly under hard skills, as the main learning project was to create an ideal writing process. Sanchez (2007) reported the results of the learning activity were marginal. Using socio-technical system analysis, an analysis of the interaction between people and technology, he determined that SL was not fully evolved or conducive for ease of use in education at the time of his study. He attributed aspects of his finding to organizational thinking which places instructional technology as a mere technical consideration. Sanchez (2007) pointed out that there is a need for design of social interaction within

instructional activities through the technology. Some of his recommendations for teaching in SL included: encouraging student informal use, including social supports, making sure students do not veer too much off topic, and providing guidance when necessary, and even using pedagogical agents in the future.

### **Acquiring soft skills through the use of SL virtual world.**

The virtual environment extends the communication capabilities available in commonly used learning management systems to multi-modal communication. One may communicate with others via general or group synchronous chat, instant messenger private chat, voice, and through the use of an avatar (simulated 3-D presence of self) or the 3-D environment. Facilitating the attainment of soft skills is technologically easier compared to simulation or attainment of hard skills, both of which take more time and resources for training and for development.

For an idea of the versatility of the learning activities possible with SL in higher education, Conklin (2007) listed 101 uses, which were organized under different disciplines. The disciplines included a range from art, business, research, and instructional technology, and the variety has increased each year. The examples exploited SL's inherent and unique learning possibilities for activities such as role-play, facilitating debates, hosting guest lecturers through SL, exploring the virtual world via quests, and using SL-specific learning and research tools.

Immersion is yet another way of utilizing what SL may offer. Learning about history was accomplished via being immersed in a simulated environment and re-enacting events. In one example, while exploring a Renaissance village in SL, students learned about respective architecture, dress, and other historical artifacts and customs of that time (Conklin, 2007).

Language students experienced immersion by having the opportunity to interact with different native speakers or by visiting an SL area that was modeled after that country (Stevens, 2006). Thus, they had the opportunity to experience different dialects, perhaps even obtain a truer representation of the culture because it was modeled by its own people.

LaChapelle (2007) explained that the pedagogy in SL allows for empathy and encounter learning, which may be particularly useful for exposing students to experiencing their feelings and empathizing with others in various situations. Learning about ourselves and other perspectives can be explored through avatar identity representations and human interactions in SL. For example, Robins (2007) researched the social alienation experienced by students dressed in large Cool Aid suits when they attempted to interact with regular-sized SL residents. As such, psychology and social anthropology courses and research studies explore what avatar representations and behaviors collectively say about us individually and the world and times we live in.

Childress and Braswell (2006) used SL to facilitate cooperative learning activities. The students and educators explored their ability to assimilate, communicate, and collaborate while working on projects. The cooperative strategies used included think-pair-share partner activities, group activities such as round robin, and jigsaw activities that include exploration and sharing. These were found to be ideal within the 3-D virtual world because communication did not suffer from the lack of immediacy, in comparison to emails, listservs, or chat rooms. The ability to interact through self-created avatars further increased presence or a sense of being there. This may have been due to the persistent visual and interactive feedback through SL. The various

ways for facilitators to keep students on track were described. These included walking around groups that were collaborating, guiding discussions, and asking probing questions. Through the use of SL, interactivity was increased in teaching and learning. Students were able to explore issues of identity and social norms within a safe environment. In this context, the classroom may have been more of a learning community that allowed for higher-level thinking, as compared to a discussion board which is solely text-based. The researchers recommended determining course and activity teaching and learning logistics and supports up-front, so that they would be in place at the onset and throughout the course (Childress & Braswell, 2006).

Hayes' (2006) ethnographic study was also informed by situated learning precepts. The study examined what supports adult learning and what might constrain it in SL. Many data sources and member checks were utilized for trustworthiness. Significant time was spent in SL, which added to the credibility of the study. Showcasing more representative data and illustrating triangulation might have further strengthened the ethnographic thoroughness of the study. Findings included caution regarding the possibility of inappropriate content in SL and the need for technical support for a smoother integration. Instructional design that creates a balance between control and freedom was recommended in the design and development of courses. This referred to providing just-in-time support and guidance opportunities while at the same time allowing for individual exploration and creativity. According to Hayes (2006), 'creation and ownership' are paramount to the learning that occurs in Second Life.



## **Chapter Summary**

Chapter two further described the instructional design theoretical base for an authentic learning environment and for activity theory. It followed with a description of the Millennial generation and how learning through virtual worlds may be relevant to them. Relevant studies in education which used virtual environments that had attributes similar to the virtual world of Second Life, such as microworlds or MMOGs, were reviewed. Empirical higher education studies using the virtual world of Second Life were broken up into application categories, highlighting a study or two in each area. However, since the focus of the current study was on the use of an authentic learning environment, focus was placed on higher education applications of Second Life which used that theoretical base or similar real-world approaches. These were further subdivided into three categories related to real-world skills, including students experiencing or working on simulations, developing hard skills, or developing soft skills.

The following chapter describes the methodology for this instructional design study. Research questions are aligned to supporting data collection and analysis methods. The participants, sampling, the research setting, and the involvement of the participant researcher are described. Then, methods are explained with their corresponding rationales. The study's scope, data collection schedules and procedures follow. The chapter concludes with a description of the trustworthiness methods which were used.

### **CHAPTER III “Methodology”**

Chapter three describes the plan of inquiry for this instructional design study. It is explained why the selected methodology of a single embedded case study design was chosen. Subsequently, research questions are aligned to supporting data collection and analysis methods. The participant sample of 18 students (ages 18-25), the method of sampling, the higher education research setting, and the involvement of the participant researcher are described in detail. Methods, which included participant observation, journals, student work documents, in-depth interviews, and focus groups, are explained with their corresponding rationales. The study's scope, the data collection schedules and procedures are described. Chapter three ends with a description of methods used to ensure the trustworthiness of the qualitative study.

#### **Research Purpose and Research Questions**

The purpose of this qualitative study was to understand student experience toward learning in an authentic learning environment within a higher education course facilitated through a virtual world, to identify characteristics of the Millennial generation in the study's game development course, and to explore virtual world media effects during the lifecycle of a real-world team project. This was an explorative case study which took place in a higher education practitioner environment. The study sought to illuminate instructional design and teaching considerations for learning through a virtual world in higher education within the context of an authentic learning framework, the uniqueness of the Millennial learner in a game

development course, and Second Life virtual world effects on communication, environment development and collaboration over time. The research questions were:

- How did Millennial students experience learning in a course facilitated through a 3-D virtual world and designed as an authentic learning environment?
- What unique characteristics did Millennials in a game development course exhibit when learning was facilitated through a virtual world which utilized an authentic learning environment framework?
- How did the virtual world affect Millennial communication, environment development, and collaboration during the lifecycle of a real-world team project?

### **Research Design**

The qualitative methodology utilized inductive techniques to gather a ‘rich thick detailed description’ of the social and technical (socio-technical) cultural scene. The study was “holistic, empirical, interpretive, and empathic” thus meeting Stake’s (1995) criteria for a qualitative study. A critical and an interpretative lens were utilized which allowed for: “collective sets of subjective negotiations of internal and external reality” (LeCompte et al., 1997). In such a manner, evidence was arrived at by comparing many different sources as they emerged, but also by examining how the sum of these actions and quotes were interpreted by the participant researcher.

A case study was chosen to explore this relatively new environment (in existence since 2003) at the time of this study in 2009. The approach was also selected in order to explore a practitioner research problem in great depth. The case study took place within a bound system of the second portion of the fall 2009 game development course that was facilitated through Second Life. The amount and type of students enrolled in the course were predetermined at the onset of the course. Due to the nature of the research questions, the study was concerned with multiple units of analysis. Accordingly, the study utilized a ‘single embedded case study design’ (Yin, 1994). In comparison to types of research questions and their corresponding qualitative methodologies, the current study’s research questions were best aligned to a case study methodology (Cresswell et al., 2007).

The principal unit of analysis for the case study was the course student body of 18 participants. This unit of analysis was used for research question one. The more explorative nature of research questions two and three enabled further shaping of the questions and a deeper research focus. During the process of later data collection and analysis, issues emerged leading to additional units of analysis, including the individual and the team project phases for research questions two and three respectively.

#### **Data collection methods.**

The study design used methods that are common to ethnographic studies (LeCompte et al., 1997). These included the following data collection methods

- participant-observation;
- journals and select student work documents;
- in-depth interviews; and
- team-based focus groups.

These data collection methods fell within the participant observation and interview branches of qualitative methodologies (Wolcott, p. 90). Ethnographic methods were appropriate in the study of a cultural system consisting of distributed learners communicating through the social media of Second Life. In this study, Second Life was not regarded merely as a technology or tool. Also, the students were not regarded as entirely separate from Second Life, especially when they were interacting within it. Research considerations were made due to the use of virtual methods, for example, conducting the focus groups face-to-face to assist in comparisons.

Research questions were mapped to corresponding data collection and analysis methods as illustrated in Table 3.1. The unit of analysis is listed underneath each research question. Table 3.1 also identifies corresponding data collection guides, and the primary and secondary sources of data that were used for triangulation purposes. For research question one, which sought to understand how Millennials experienced learning in a game development course facilitated through a virtual world and designed as an authentic learning environment, data collection and analysis methods are identified in the top row of Table 3.1. For research question two, which sought to identify unique characteristics of Millennials in a game development course when learning is facilitated through a virtual world using an authentic learning framework, data

collection and analysis methods are identified in the second row from top to bottom of Table 3.1. For research question three, which explored how the virtual world affected Millennial communication, environment development, and collaboration, data collection and analysis methods are identified in the bottom row of Table 3.1.

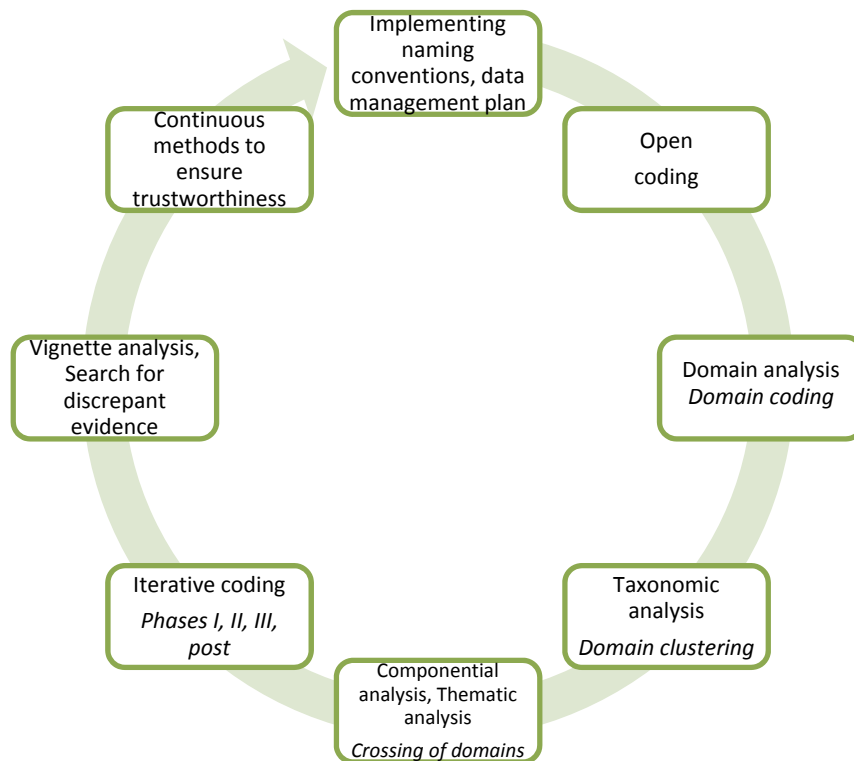
Table 3.1  
*Research Questions and Methods*

	Data Collection Method	Instrument	Triangulation	Data Analysis Method and Sequence
<u>Research Question #1</u>	Participant Observation	Observation Field Notes	Primary method	Initial Domain Analysis 1 <sup>st</sup> and 2 <sup>nd</sup> Taxonomic Analyses
Unit of Analysis: Classroom	Journals	Journal Guide	Secondary method	2 <sup>nd</sup> version of Domain Analysis Theme Analyses
	Interviews	Interview Guide	Third method	
<u>Research Question #2</u>	Interviews	Interview Guide	Primary method	3 <sup>rd</sup> version of Domain Analysis Vignette Analysis
Unit of Analysis: Individual	Journals	Journal Guide	Secondary method	Domain Overview of the Case Study Scene
	Participant Observation	Observation Field Notes	Secondary method	Componential Analysis
<u>Research Question #3</u>	Focus Groups	Focus Group Guide	Primary method	4 <sup>th</sup> version of Domain Analysis Vignette Analysis
Unit of Analysis: Project Phases	Journals	Journal Guide	Secondary method	Chronological Trend Analysis: 'Collaboration'
	Participant Observation	Observation Field Notes	Third method	Chronological Trend Analysis: 'Environment' 3 <sup>rd</sup> Taxonomic Analysis

## Data analysis methods.

### *Research question one: Focus on authentic learning environment.*

For research question one, data analysis methods used included domain, taxonomic, and theme analysis (Spradley, 1980). Figure 3.1 illustrates the data analysis process which was used for the case study. Domain analysis worksheets such as the sample in Table 3.2 were used to develop each of the 22 domains of the case study (Appendix F).



**Figure 3.1** Case Study Data Analysis Process



***Research questions two and three: Focus on the learner and a virtual world.***

There is a distinction between how research question one was embarked upon in comparison to how the other two research questions. Research questions two and three were about unique issues which emerged from being grounded in the data (Corbin & Strauss, 1998). Throughout the iterative process of data collection and analysis, the constant comparative method from grounded theory (Corbin & Strauss, 1998) was employed. This method was particularly valuable for these more explorative questions as key issues were in constant flux. The constant comparisons resulted in the refinement of the two research questions and the eventual saturation in the data. Data analysis methods used included domain analysis, taxonomic analysis, componential analysis and vignette analysis (Spradley, 1980), and chronological trend analysis (Bernard & Gery, 2003).

For research question part 2.1, through the use of domain analysis, the learners were categorized into learner types. Each learner type experienced the use of the virtual world in the higher education learning context differently. Further analysis brought to the foreground the main characteristics for each of the learner types. For research question part 2.2, domain analysis revealed virtual world learning engagement challenges experienced by the learners. A subsequent componential analysis reviewed how each of the learner types fared according to three factors that were considered to potentially influence virtual world learning engagement.

Vignette analysis was used as data visualization for components of research questions two and three. For research question 2.1, a vignette was constructed to illustrate perspectives

about learning through a virtual world in the game development course. The method of vignette analysis involved the researcher constructing the vignette out of quintessential participant types, perspectives, quotations, activities, etc. (Merryfield, 1990; in Miles & Hubberman, 1994). For research question three, the vignette analysis method was utilized to construct an archetypal Instant Messaging dialogue during a typical virtual world class session. The objective of the second vignette analysis was to unravel virtual world effects on communication.

Research question three utilized chronological theme analysis (Bernard & Gery, 2003). Three emergent phenomena were tracked and analyzed for differences over the team project phases. These included changes in communication, development of the student environment, and progress toward project collaboration. Using Goodall's (2008) recommendations for qualitative writing, the current study's fourth and fifth chapters were developed as a result of an iterative process between data analysis, writing the case study story, and additional literature review and self-reflection. The process was concluded upon data saturation, through which the same themes began to emerge again and again confirming what has already been discovered and elaborated upon.

Table 3.2  
*Domain Analysis Worksheet*

<i>Domain Analysis Worksheet</i>		
<hr/>		
<i>Semantic Relationship:</i>		
<i>Form:</i>		
<i>Example:</i>		
<i>Structural Questions:</i>		
<hr/>		
<i>Included Terms</i>	<i>Semantic Relationship</i>	<i>Cover Term</i>
<hr/>		

**Participants**

**Selection criteria.**

The participants were higher education undergraduate students who fell within the age range of 18-25 years and had never before utilized the Second Life MUVE. This is a traditional undergraduate student age which fell within the range of the Millennial generation. The students were enrolled in a course which was facilitated through Second Life the second portion of the fall 2009 university semester. This component of the course was designed using an authentic environment learning framework. In this introductory game development course, students worked on real-world team projects with three phases, corresponding to design, development, (role-play) and reflection. The sample was chosen based upon a criteria which included higher education students who

- fell within the age range of 18-29 years;
- had never before utilized Second Life; and
- were enrolled in a course which utilized the Second Life MUVE designed according to authentic learning environment guidelines.

**Sample.**

The sample was purposeful because the characteristics of the participants paralleled a future target population for which there would a need to design and develop an ideal course within a MUVE. It was also a sample of convenience due to being accessible to the researcher (Merriman, 1998).

The participant sample unit of analysis consisted of 18 students. The size of the sample was conducive to reviewing multiple perspectives as well as exploring unusual cases in greater depth. Due to the fact that the student: instructor ratio was somewhat larger for this university's customary 12:1 ratio, it was conjectured that the larger course size might have been due to the appeal of the game development topic for the Millennial tech-savvy generation. Though some of the students had not yet declared a major, most were planning a computer science major with a concentration in game development. Additional majors in the sample included technical fields such as science, math, engineering, or technology (STEM). Students majoring in disciplines that are usually considered more creative, such as graphic design or communications, were only nominally represented.

**Sampling within the sample.**

Whereas the team focus groups were simply chosen according to class teams, the interview participants emerged from the study. At the onset of sampling for interviewees, volunteers were randomly chosen. As the research study progressed, the criterion for interview sampling followed a cyclical process during which a range of illustrative cases were pursued. Team leader informers emerged from the sampled range of illustrative cases. In addition to being team leaders, these interviewees were gamers from an early age, even prior to pre-school, and identified themselves as gamers at the time of the study. Research attempted investigation with those cases which exhibited the most chances for comparative analysis of their similarities and differences. For an extreme comparison, the perspective of the only female non-gamer in the all-male class was sampled.

**Research Setting**

The research setting was a middle-sized private university located in a suburb of a large metropolitan city in the Midwest. The study took place at a university distributed across four main colleges including management, arts and science, architecture and design, and engineering. Specifically, the study took place in the department of math and computer science. The course was *Introduction to Game Development and Animation*, which is the first course within the curriculum sequence of a computer science major with a concentration in game development.

The content was developed and facilitated using instructional guidelines for an authentic learning environment. Analogous to Herrington & Oliver's (2000) study, authentic learning environment guidelines were mapped to instructional design for use with the SL MUVE.

Strategies used included use of a real-world context, ill-structured problems, collaborative learning, reflective learning, progressive disclosure, etc. Authentic assessment was used to match the authentic context and problems. The study involved a team project of designing and developing a game, testing the game by role-playing it with a random player, and completing reflective learning exercises throughout the project.

### **Virtual world context.**

The introductory game course was unique because the 1<sup>st</sup> half of the course was held in a face-to-face regular classroom, while the second half of the course was facilitated through the Second Life MUVE. This study was concerned with the second half of the semester, during which the class was facilitated through Second Life. In 2008, the university became a member of *New Media Consortium* (NMC) organization and leased a quarter of a Second Life (SL) virtual island. As a participating member and leasing virtual land, the university had access to virtual property with building rights, access to a set of rentable virtual classrooms and an assortment of free teaching and learning tools, assurances of online safety, and other educational services. Though the land was leased through NMC, it actually referred to server space located in the San Francisco Bay area, which along with the entire Second Life MUVE is owned by the *Linden Lab* company.

Students needed adequate computer hardware, either dedicated to them or that they could access, on which Second Life was already downloaded. They also needed high speed internet and Ethernet cables in order to establish a satisfactory connection with the *Linden Lab* servers. The university provided all of the undergraduate students with laptops, fast connectivity, and

Ethernet cables. The students themselves downloaded their free Second Life viewer and signed up for their free Second Life accounts. In addition, the university's Blackboard learning management system was also utilized as an ancillary part of the online learning environment for announcements, retrieval and submission of documents, and the discussion board.

### **Research problem background.**

I initially became interested in this research problem in the fall of 2008. At the time, I had a more involved course developer role for the same introductory game course with a different cohort of students. For approximately 35% of the course, I team-taught and piloted the use of Second Life through discussion and use of the environment. Through the experience of first-time teaching and learning in a MUVE, I gathered an awareness of the many complexities and practical challenges involved. I considered that these challenges might have been due to an unclear learning and instructional design theories or best practices for integration for this particular medium. This initial experience set the stage for wanting to better understand this new online environment, especially with respect to its unique student body who was experiencing it for the first time in a formal learning setting. My background and experience were well matched to research this timely problem due to

- extensive skills and expertise consulting faculty and subject matter experts on the design of instruction and integration of new media and technologies;
- unique knowledge set and interest in instructional design, MUVEs, and authentic learning environments;

- experience and interest in qualitative inquiry in order to understand a socio-technical system; and
- access to a practice-based research setting.

### **Researcher relationship to the study.**

In qualitative studies, it is important to accurately specify the relationship of the researcher with the research setting and sample at the time of the study (Merriman, 1998). As researcher, my other role in connection to the research setting is that I'm a course developer at the university. As course developer, I consult faculty on instructional design, assist in the design of interactive learning activities, assignments and assessments, suggest and integrate strategies, resources, new media and technologies, convert face-to-face courses to online or hybrid courses, and promote the scholarship of teaching, learning and technology. During the fall 2009 study, I provided suggestions for the use of Second Life and on designing according to authentic learning environment guidelines for the game course; however, I did not have a role as a teaching assistant as in 2008. This removed the likelihood of a bias that may have resulted due to a fully participatory role as a teaching assistant. The precaution also avoided possibly contaminating the study as is sometimes the case with team-teaching. However, there may have still been a very slight bias from my pre-existing perceptions of the situation. Various methods, such as the use of a reflective researcher journal, were utilized to guard against researcher bias.

My relationship with the participants included the role of 'observer as participant' as well as the role of the 'participant as observer' (Merriman, 1998). In the more removed capacity of 'observer as participant', I was present during all class sessions delivered through Second Life



however I did not interfere with the activities. For example, if the discussion had strayed away from topic, I did not take on the responsibility to bring it back on track. In the more active role of ‘participant as the observer’, I was involved with the team focus groups. In this role, I assisted the teams by debriefing them about their game prior to the rehearsal and participating in their role-play rehearsals.

### **Data Collection Schedules, Methods, and Procedures**

#### **Data collection schedule.**

Table 3.3 is a summary of the data collection schedule. The data collection schedule was subdivided into three phases corresponding to the initial, middle, and final phases of the large-scale team project. The team project began mid-semester of fall 2009, lasted for approximately eight weeks, and was completed by the end of the semester. The last part of the study included interviews and participant observation approximately three weeks thereafter for further reflection and substantiation purposes.

#### **Descriptions of data collection methods.**

The data collection methods used included participant observation, journals and documents, interviews, and focus groups. Throughout the study, students were asked open-ended questions about their game development learning in the virtual world, their experience in the virtual world, and their experience of teamwork in a virtual world. Depending on the situation, branching questions were used that further inquired about the authentic learning framework employed in the course. Data collection guides for the study may be reviewed in Appendix B.

Table 3.3  
*Data Collection Schedule*

Methods	Phase I: Oct/Nov 2009	Phase II: Nov/Dec 2009	Phase III: Dec/Jan 2009
Observation Field Notes of 14 class sessions or 1,260 minutes	5 Observations of class sessions	5 Observations of class sessions	4 Observations of class sessions
Reviews of Select Student Work (8 sets of data)		Review of 4 Team Projects (1 per team)	Review of 4 Sets of Individual Student Work
Include snapshots and machinima			
Semi-structured Journal Entries for 7 Weeks (18 participants)	13 entries from a set of 2 teams	13 entries from a set of 2 teams	11 entries from a set of 2 teams
	+5 random entries from other set of 2 teams	+5 random entries from other set of 2 teams	+5 random entries from other set of 2 teams
12 In-Depth Interviews (6 Interviewees)	4 Interviews:	3 Interviews:	5 Interviews:
A and C over 3 phases	1.) A1	5.) A2	8.) A3
B and E over 2 phases	2.) B1	6.) C2	9.) B2
	3.) C1	7.) E1	10.) C3
	4.) D		11.) E2
			12.) F
4 Focus Groups of Teams of ~4	Focus Group:	Focus Group:	2 Focus Groups:
			White Team (Phase III: Prototype enactment)
Each facilitated at different Phase of Team Project	Purple Team (end of Phase I: Design)	Red Team (end of Phase II: Development)	Blue Team (Phase III: Post-Enactment Reflection)

***Participant observation.***

Participant-observation (Spradley, 1980) included both synchronous and asynchronous review of

- chat and audio recordings (transcripts);
- 3-D environment and artifacts, and avatar appearance, positioning and actions (snapshots);
- content delivery and interactivity, and the nature of activities and their sequencing (observation field notes); and
- screen captures of student role-played games (machinima).

Participation observation of class sessions included 14 class session or 1,260 minutes.

***Journals.***

The participants were asked to complete weekly journal entries. The rationale for using journals was to collect a wide range of responses. The other rationale was to gather data that students might not necessarily exhibit in class or convey explicitly during an interview or focus group. Approximately 75 journal entries were collected and 53 analyzed. They were tracked within respective team clusters in order to substantiate other team-related claims.

***In-depth interviews.***

12 open-ended interviews were conducted in total. This included 6 different interviewees in an effort to collect a variety of in-depth perspectives. 4 out of the 6 interviewees were interviewed about 2-3 times over a three month period to ensure repeatability. Open-ended interviews (LeCompte & Schensul, 1997) were used in order to extend participant observation

and journaling into exploratory situations whereupon dialogue and interaction with researcher expanded and illuminated new issues. Another rationale for the use of interviews was the opportunity for relationship building and trust between the participant researcher and the interviewees. It was observed that issues such as team challenges while learning in virtual world were better facilitated through one-on-one, safe interview interaction than other methods.

Made possible by keeping the research methodology iterative (Maxwell, 2005), new research strategies emerged during data collection. For example, interviews were kept deliberately informal in order to increase the conversation flow. Also, a fourth of the interviews were conducted after the project for reflection purposes. These interviewees had already been interviewed at least one to two times prior. The reflective interviews were collected in order to lessen a possible bias due to being enrolled in the course. In addition, having some time pass, amplified the opportunity for the participants to provide a more holistic account of their experience. To eliminate interference due to various media effects, some of the virtual world interviews were deliberately collected primarily through chat, some primarily through audio, and some using chat, audio, 3-D interaction and virtual world travel.

The interviews took place during different project checkpoints in order to examine changes due to different times of the project. The interview schedule (Table 3.4) coincided with the team project phases consisting of design during phase one of the project (4 interviews), development during phase two of the project (3 interviews), and testing and reflection during and after phase three of the project (5 interviews). Each interview lasted from about 30 minutes to two hours.

Table 3.4  
*Interview Schedule*

	Phase I	Phase II	Phase III
Week 1	I1 Sarah		
Week 2	I1 Derrick		
Week 3	I1 Nathan		
Week 4	I1 Luke	I2 Sarah	
Week 5		I2 Nathan	
Week 6		I1 Bill	
Week 7			I3 Sarah
Week 8			I2 Bill
Reflective			I3 Nathan I2 Derrick I1 Zach

***Focus groups.***

There were 4 team-based focus groups throughout the study and each was facilitated at a different phase of the team project. The rationale for this scheduling was to detect virtual world teamwork changes over time and to detect changes based on the time of the project. Guidelines for facilitating focus groups by Schensul et al. (1997) were utilized. The focus groups served a dual purpose. They were the only face-to-face team meetings in relation to the team game project. Also, this one face-to-face data collection method provided a basis for comparison to the other virtual methods gathered from the individual students, the teams, and the team project phases. Each focus group session lasted approximately one and half to two hours.

**Procedures.*****Informed consent and confidentiality.***

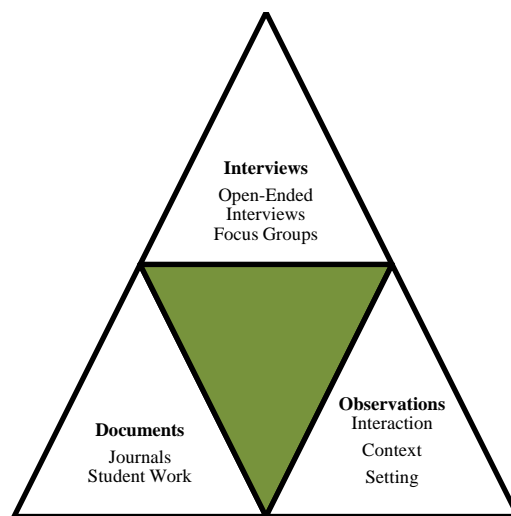
Possible participants were given a letter explaining the research study and a Human Investigation Committee information sheet (Appendix A). Participation in the study was voluntary. The participants were assured that their disclosure was confidential and that their identifiers, such as their names, were to be kept confidential. For confidentiality reasons, all records of actual student names were replaced with pseudonyms. Also, students were advised to generate avatar (a visual representation of the person in the virtual world) names that did not resemble their real names. All of the students created a name other than their own. Participants were able to make a request that any of the data relating to them be shared with them.

Potential interview participants were approached by inquiring whether they would be interested through Instant Messaging. If so, the time and place of the interview was also arranged through Instant Messaging. If there was interest for follow up, the participant was asked whether they would mind being interviewed again and when is the best time for them. The focus group times were arranged in a similar manner, however, these were based on the four existing teams.

**Trustworthiness**

Table 3.5 summarizes methods used to ensure internal and external validity, and reliability of the case study. Triangulation methods (Figure 3.1) were used to ensure

trustworthiness by corroborating evidence from different methods and sources. This involved evaluating how the findings aligned with different methods, and evaluating alignment across different sources. Findings were measured against a deviant case study (Stake, 1995). For example, the male team leader/gamer was compared to the female non-gamer. Similarly, parallel units of analysis allowed for comparison between equivalent sources.



*Figure 3.2* Triangulation of Methods

Multiple methods were used to address validity, yielding “rich thick detailed description” from diverse perspectives. In-depth individual interviews and team focus groups enhanced the quality of the data. Most interviews lasted between a half-hour to an hour and a half, and all focus group sessions lasted for over an hour. Though some interview and focus group prompting questions were pre-planned, discussion was allowed to naturally evolve. Time spent in-world as participant researcher supplied additional dimensions of observation for confirmation and refutation of data findings. Collective comparison of the outcomes from different methods, aided the soundness of the interpretations (LeCompte et al., 1997).

Table 3.5

*Trustworthiness Methods*

Internal Validity	<p>“Rich, thick, detailed description” for presentation and visualization of empirical data triangulated through different sources and methods</p> <p>Member checks Search for discrepant evidence</p>
External Validity	<p>Grounded theory - multiple perspectives and sources</p> <p>Peer checks</p> <p>Parallel data pulling</p> <p>Data collection schedule – equivalent methods and sources at different points in time</p>
Reliability	<p>“Rich thick description” of research setting, participants, and researcher involvement</p> <p>Adherence to data collection protocol</p> <p>Researcher journal - preliminary interpretations, reflections</p> <p>Case study audit trail (comprehensive documentation of data collection and analysis - raw data, research analysis procedures, chit sheets and research notes)</p>

Member and peer checks were also employed. Research participants were periodically asked to review evidence at a particular juncture and to provide feedback as to whether they thought it accurately represented the situation. The checks helped to elucidate possible biases and misrepresentations within the data, as well as to provide confirmation of the findings. The feedback was used to revise interpretations (LeCompte et al., 1997). One such check helped clarify what other things may be going on in the background of the classroom activity, which was helpful in elaborating and summarizing the spatial taxonomy analysis.



Reliability of the study was addressed by thoroughly describing the organizational research framework, participants, research setting, background of the problem, researcher relationship to the study, data collection schedules and procedures, and detailed documentation of the study. Henceforth, if the study were to be conducted again, adherence to these specifications would yield an approximation of the original research context and procedures (Merriman, 1998).

Another assurance of reliability involved documenting the case study research through the use of an audit trail, thus explaining the sequence and nature of any changes throughout data collection and data analysis. If the study were to be undertaken again, the processes used could hypothetically be reproduced. The audit trail included all researcher observation field notes with researcher journal notes, interview and focus group transcripts, data analysis stages and worksheets (LeCompte et al., 1997).

### **Chapter Summary**

Chapter three explained the rationale for the qualitative case study methodology and methods for the research questions which were being posed. The methods included participant observation, journals, student work documents, in-depth interviews, and focus groups. The research context, participants, and participant researcher involvement were described in detail. Then, the schedule, data collection methods, and procedures were identified. The chapter ends with an explanation of the methods followed to ensure the trustworthiness of the study.

In chapter four which follows, findings are broken up into three sections, each corresponding to the posed research questions. The findings are represented in their raw form as

quotes within explanatory text through ‘rich thick description’ and matrices, participant researcher observations, images (snapshots from Second Life), and vignettes. Where appropriate, discussion follows in terms of what was noteworthy, with additional analysis and interpretations.

#### CHAPTER IV “Discussion of Findings and Interpretations”

This chapter chronicles the study’s data collection and analysis findings and discusses participant researcher interpretations. First, research questions are reintroduced with a brief summary referencing their respective data collection methods and analysis. Second, the study’s findings are presented through ‘rich, thick description’ using participant quotes and participant observations. Tables, matrices, and models are employed as visual data displays that further analyze and support claims. Where appropriate, results are additionally discussed through interpretation.

The research questions were:

- How did Millennials experience learning in a course facilitated through a virtual world which was designed as an authentic learning environment?
- What unique characteristics did Millennials in a game development course exhibit when learning was facilitated through a virtual world which utilized an authentic learning environment framework?
- How did the virtual world media affect Millennial teams during the lifecycle of a real-world team project?

The first research question was predominantly guided by theory as compared to the other two more exploratory research questions. For research question one, nine authentic learning environment guidelines provided the preliminary structure for analysis. These were used toward understanding of the student experience in a game development course facilitated through a 3-D virtual world.

The second portion of the study was of a more exploratory nature and its findings emerged from being grounded in the data. For research questions two and three, there was a strong emphasis on participant researcher reflection and data collection and analysis iteration. Unique issues progressively emerged out of what were originally general ones. Initial research questions inquired about the Millennial learners in the game development course and the team project over time through a virtual world in general. These questions were honed by their respective units of analysis; “the individual” was used for question two and “the team project phases” for question three. The inquiry was further developed by vetting toward key issues and understandings.

#### **Research Question I Authentic Learning Environment**

##### **Student Experience toward Learning in a Course Facilitated through a Virtual World and Designed as an Authentic Learning Environment**

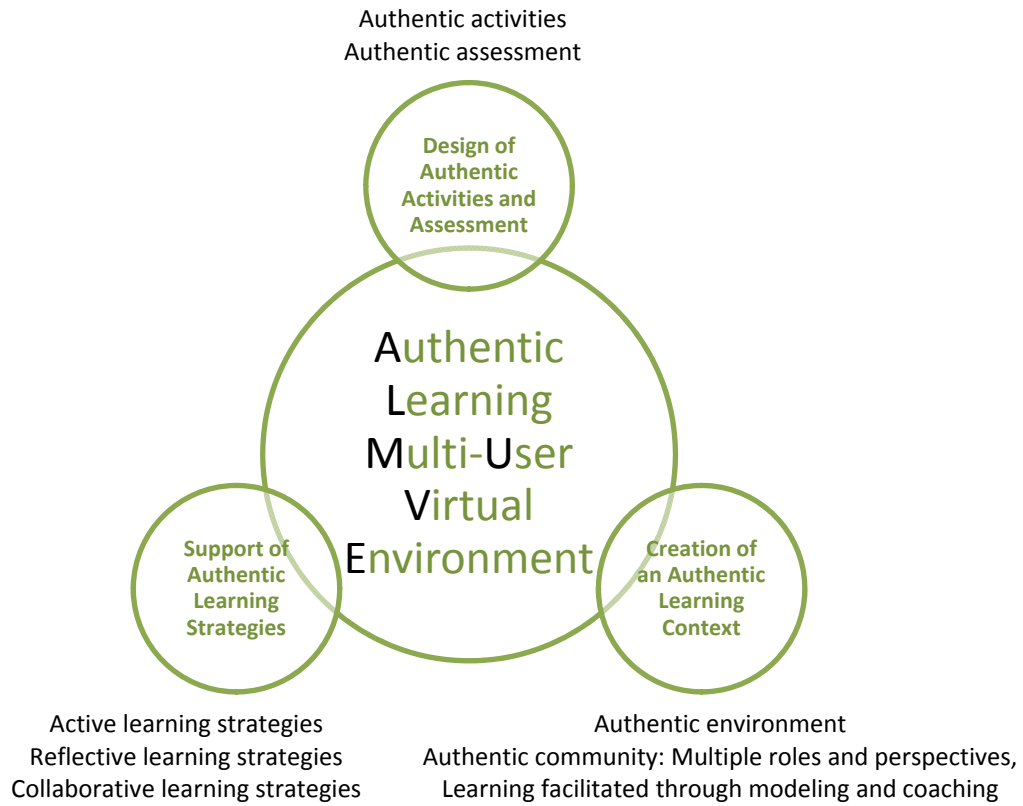
The purpose of the first research question was to answer how Millennials experienced learning in a course facilitated through a 3-D virtual world which was designed as an authentic learning environment. The unit of analysis for research question one was the class consisting of 18 participants. First, participant observation was used to collect a wide sample of data and to identify key informers. Participant observation data was also used to discover new issues and to confirm emerging findings.

Time spent in class in the role of participant observer and review of student project data afforded a rich body of data which was collected over a span of three months. The type of data collected in participant observation field notes typically consisted of researcher observations, Chat dialogue, Instant Messaging, descriptions of the environment and descriptions of class

session activities and their sequencing. Some observation field notes included snapshots of the student avatars as well as the student-created classroom and artifacts. A set of typical observation field notes may be consulted in Appendix C.

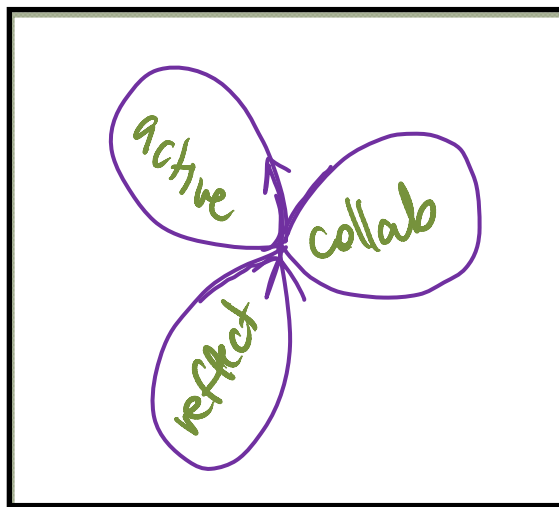
After three sets of observation field notes and three sets of participant weekly journal entries were collected, a preliminary domain analysis was conducted. It revealed that if data collection were to continue on as is, the resultant data would not be as descriptive as had been anticipated. In other words, there would not be a rich enough data set for a truly explorative data analysis. It was conjectured that some of the participant reticence with sharing their impressions may have been related to being freshmen, especially when considering the majority's science and technical majors. The data collection issue was addressed by slightly modifying the journal format from an open-ended to a semi-structured journal format. It was also addressed by making the interviews purposefully more casual.

A case study scene summarized the domains (Appendix F). The domains were analyzed iteratively during and after data collection to present a more realistic snapshot of the case study. The structure which resulted from the domain analysis was used as a systematic guide for discussing findings (Figure 4.1.11). A detailed domain analysis (Appendix G) unpackages the student experience toward learning when an authentic learning environment is used together with a virtual world. Efforts were made to triangulate with at least three or more quotes, participant observations, or other data, such as snapshots, to support findings. These were drawn from the primary data collection method, an alternate data source, and a secondary data collection method (Table 3.1).



**Figure 4.1.11** Model of Learner Needs for an ALMUVE  
(Authentic Learning Multi-User Virtual Environment)

## Authentic Learning Strategies



*Figure 4.1.12* Model of a Learner Employing Authentic Learning Strategies

The model in Figure 4.1.12 is used as an advanced organizer for discussing active learning, reflective learning, and collaborative learning strategies, which are represented by the three node clouds. At any point in time, the learner may be occupying any one or more of the three node clouds. Depending on how engaged the learner is in using a learning strategy, its node cloud may increase in size.

### **Active learning.**

This section describes how the environment was designed and facilitated to “Promote articulation to enable tacit knowledge to be made explicit (Herrington and Oliver, 2000, p.6)” and how the students experienced the practice of active learning in the virtual world. The section also discusses rationales as to why these findings are noteworthy.

***Various ways of expression and class session choreography tend toward more learning engagement.***

Students were able to express themselves through multiple means. A few examples included class discussion in the chat, individual activities such as the development of their non-player character (NPC), and collaborative activities such as role-playing their non-player character (NPC) during team role-play. The team project culminated in the following active learning opportunities

- collaboration in the creation of a game as part of a game development team;
- design and testing of a game for a target audience and reflection about lessons learned; and
- realistic experience of game components and the need for their alignment within a game.

Active learning within the project was more likely to be sustained when activities were choreographed and varied. For example, during one such observed class session (Appendix C) the student discussion was frequent and involved with the content. In comparison, one class session was entirely a lecture on 3-D modeling, during which there was no opportunity for meaningful interaction for the students. During this lecture, it was also difficult to infer whether the students were active or passive.

***Slight increase in participation in virtual world compared to face-to-face.***

Between 25-50% of the students contributed regularly in the Chat discussions. Derrick commented that, provided the discussion is relevant to games, participation in the virtual world increased as compared to what it had been during face-to-face class sessions:



*"I would assume I'm more talkative online, but I don't have an unbiased way to measure it. I think when an opportunity comes up where they [Researcher (R): in reference to other students] want to speak...I.E. about a game...more people jump on the opportunity to speak when they're online...than when they're offline." – Derrick\_I2 [8:34-8:35]*

This insight might not be solely applicable to the virtual world environment, but to an online environment in general, as both may exhibit an added loss of inhibition.

Participation also varied for reflective journal entries, but in a different manner. Since the journals were required, they were completed by the majority of the students. In terms of journal entries' content, however, approximately 25-50% of the students provided adequate reflection through personal examples and application. This might have been related to a slight loss of comfort level, perhaps even accountability, within the ill-structured format.

***More conducive to collaborative versus individual active learning.***

Individual student activities were not as successful for learning engagement as compared to collaborative ones. In instances where there was a lack of clarity with directions or when directives were not explicit, more than 75% of the students did not ask for clarification nor try out new approaches on their own accord. When asked how to get students to meaningfully contribute in the virtual world, team leader Bill was quite keen to point out strategies such as redundancy in messaging of high expectations, use of random calling, specificity in questioning, and accountability through use of grades:

*"...some care more than others i guess...make it effect [sic] their grade...that's [sic] always works...and stress it...keep saying it...and have the Instructor call people out when they aren't participating...say their name...instructor is too general...be specific...if they respond, then cool, if not, then mark them down. " – Bill\_I1[13:01-13:04]*

For the collaborative activities, there was an explicit necessity for teams to meet, which facilitated dispelling misconceptions and learning new things from peers. During the third phase of the team project, students were observed as participating more fully in their different game development team roles and game NPC roles. This was observed through dialogue, Instant Messaging and co-created artifacts and other indicators. The increase in engagement might have been due to progressively having more comfort with the virtual world as a learning environment. It might also be attributed to the team project requiring a higher level of immersion at this phase.

***Wide range of learning domains and problem types possible for real-world project.***

The middle column of Table 4.1.11 lists examples of active learning strategies students employed during different phases of the team project. These active learning strategy examples from participant observation and inferences are further corroborated by student quotes in the right hand column. The students were exposed to a number of different types of problems within their larger real-world project. Many of these fit categories put forth by Jonassen's (2000) design theory of problem-solving.

In the far left column of Table 4.1.11, active learning strategies are further categorized into different types of learning. The employed active learning strategies were distributed across a range of learning domains. This included lower level and higher level cognitive learning (Bloom et al., 1956), and affective learning (Krathwohl et al., 1964) domains. This is not to say, however, that all students engaged in all types of learning. It does, however, illustrate the range of active learning strategies possible with a real-world team project that is facilitated through a virtual world.

*May be more conducive for higher level and affective domains versus lower level learning domain.*

Table 4.1.11 also reveals that higher order and affective learning tended to be more prevalent within the virtual world environment in comparison to the lower level cognitive learning domain. This is consistent with Smith & Ragan (2005) who stated that constructivist learning environments have advantages in accessing higher-order learning and problem based learning. However, they presented limitations to constructivism when interpreted by practitioners as prescribing “activity for activity’s sake,” rather than basing instruction on learning goals (Smith & Ragan, 2005, p.17).

In comparison to Phase I of the project, more learning engagement was exhibited by the end of the team project. This was evidenced by the increase and enhancement of the different types of active learning strategies in Table 4.1.11, Phase II. It could also be witnessed by more students spending incrementally more time in-world. This was partially attributed to students being more adapted to what is possible in SL. Also, some students might have accrued buy-in toward using SL through the actual experience made possible by the conclusion of their game projects.

Table 4.1.11

*Theme Analysis: Active Learning Strategies in a Virtual World*

Type of Learning	Active Learning Strategy	Phase I Examples <sup>a</sup>
Lower Level Cognitive	Figuring out how to use new technology	<i>What helped this week was being able to figure out what second life is and how it worked in class.</i> B_Luke_J1 [1975-2074]
	Differentiating concepts	<i>I learned about particularly linear and nonlinear stories, examples of them and what defines them.</i> B_Nathan_J2 [1035-1133]
Higher Level Cognitive	Problem solving	<i>it was confusing getting everyone in the group together in one spot to have a group discussion, which hampered our progress on that group discussion for that first half. I think to enhance the class everyone needs to add their team mates to their second life friends list to make it easy to tell when they are on and where they are so that we can more easily get to one location for group discussions.</i> W_Storm_J1 [1351-1758]
	Reflecting upon discussion to personally relevant games	<i>the Legend of Zelda games for the Nintendo 64 and later platforms give the player enough leeway to go on grand side adventures while still keeping the player within the confines of the storyline</i> W_Chip_J2 [1059-1255]
	Creating a unique game	<i>As for our game we now have ideas for a name and certain criteria added to what we want on top of all that we already have.</i> B_Luke_J2 [2253-2377]
	Analyzing a real-world game	<i>Assassin's Creed games, the player can do--almost literally--whatever he or she wants to do, and the player's actions influence the rest of the game's story. So a good story can allow a player a good deal of freedom while still keeping them in the context</i> W_Chip_J2 [1288-1547]
Affective	Valuing the team and teamwork planning	<i>I think that our inworld teamwork is really paying off. We have an idea of what we would like to accomplish in our game, a target audience, and the building blocks to a pretty good story line.</i> B_Luke_J1 [2552-2750]
Type of Learning	Active Learning Strategy	Phase II Examples
Lower Level Cognitive	Using an Instructor-provided scaffolding model	<i>I learned about the knight and the dragon model of how stories are built and how the characters portray the look and feel of a story.</i> W_Bill_J3 [1060-1197]
	Reviewing an example and discussing it in class	<i>The assignment helped by giving me a feel for what a premise and synopsis is. The assignment that was given for the project regarding the story of our game also helped me understand a bit, as well as the chat session we had in class.</i> B_Luke_J3 [1482-1730]
	Reading and contrasting with personal perspective	<i>the character is the single most important point of a story. Certainly, the literature aspect of a story is vital as well: plot, rising action, falling action, and resolution. But the plot involves characters interacting with each other</i> W_Chip_J3 [514-757]
Higher Level Cognitive	Integrating mini lecture content into Interview activity	<i>I learned by listening to the professor describing the role of the characters motives to the story and by discussing the roles and motives of my teams characters and how that effects the motives of the player.</i> W_Jack_J4 [1150-1362]
	Learning by doing (using SL's 3-D modeling tool)	<i>I learned about the 3d modeling system in Second Life and how to make primitive shapes and objects within SL.</i> B_Nathan_J4 [173-283]
	Explorative learning (using SL's scripting language)	<i>I learned this week how to create, link, and give actions to objects.</i> B_Luke_J4 [439-509]
Affective	Appreciating multiple perspectives' on different stories	<i>I learned about characters within a story. I learned how characters are different and how they can have many different affects on the environment as well as the story.</i> W_Jack_J3 [1072-1240]
	Acknowledging the quality of interpersonal communication	<i>Thursday was a better conversation/interview between Team B and Team A. Both teams seemed to present their roleplaying game story quite well</i> B_Nathan_J3 [1161-1302]

	Elaborating on a personal position of a class debate	<i>I learned that characters that have motives and develop throughout a story are generally more likeable. Just as this is true for movies and books. W_Storm_J4 [437-587]</i>
Type of Learning	Active Learning Strategy	Phase III Examples
Lower Level Cognitive	Contrasting planning and design versus an ad-hoc approach	<i>It makes the conversations go much quicker and smoothing [sic], and no one is in a panic because they have no idea what to say or forgot their lines. Also it makes sure that nothing is said that is difficult to create a response to, and keeps the game on track. W_Storm_J6 [1209-1467]</i>
	Creative problem solving	<i>our team didn't have a single `set' of answers. It was more on the scale of a rough framework of dialogue that our characters would have with the player. But this kind of thing would enrich the experience by providing more options for any answer. W_Chip_J6 [1798-2047]</i>
	Analytical reasoning in order to create game branching	<i>By giving them a logical response that can be chained to other questions, instead of wasting time trying to recall what we are going to say. W_Bill_J6 [1271-1417]</i>
	Creating a inexpensive fantasy world in a safe environment to match the game	<i>The fantasy world did make the world more believable because it allowed there to be an actual world behind the game, specifically suited to that game. W_Storm_J6 [2609-2761]</i>
	Real-world user testing	<i>The creation of a fantasy world definitely made the game more believable because the player could actually see what was going on and the image we were trying to capture in the idea of our game. W_Jack_J6 [2919-3115]</i>
Higher Level Cognitive	Analyzing affordances of multiple media that may affect authenticity	<i>Reading about an rpg game doesn't give the full experience of making or actually playing the game as the character (or role), and just provides information about the character and the settings of the game. Listening to an rpg game lecture would only give an idea of the contexts of the game and how to play it. Working with a team to create an RPG prototype and test it with a random player gives the developer and players a chance to experience the game from an audience's point of view as well as witness possible glitches and errors in the programming and development of the game. B_Luke_J7 [737-1326]</i>
	Collaborative and creative problem solving (resulting in markedly different RPG game design solutions from each of the four teams - unique fantasy worlds, player goals, and game rewards)	<i>[R: Students were asked to answer the following questions about each of the games: a) Fantasy world portrayed? b) Player's goal? Use of Quests?and/or Tested knowledge? and/or Skills? c) Player's reward? Personal benefits or `World peace type' benefits?] Rides a) As an amusement park b) To ride the rides and have fun c) Enjoying the rides CarWars a) A world with only cars b) To defeat the Grime Gang c) In this section, to win Nathan's tire Sam and the Dragon a) The traditional dragon based story b) To rescue the damsel in distress c) Rescue the damsel or not Contamination a) Through the curing of mutated animals b) To cure the infected and stop Dr. Crosby c) The player saves the animal and stops the Dr. B_Nathan_J7 [771-1572]</i>
Affective	Expressing different opinion as to how each of the games is interpreted (RO: comparison of different answer to same question above)	<i>Rides a) They gave the game an "amusement park" b) To ride the rides and have fun c) This was a more personal benefit than a "world peacetype" benefit. CarWars a) The environment was set to portray a foggy scene b) The player's goal was to win a race. No quests. c) It did not test knowledge but tested the player's reaction skills. This was a more personal benefit than a "world</i>

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*peacetype" benefit.*

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Reflecting about opportunities for project improvement	<i>Having a premade set of dialog options could have enriched the players experience because there was not a lot of delay between lines in the conversation, which there could have been in person because of having to think and remember the dialog. W_Jack_J6 [1533-1779]</i>
Valuing the opportunity in the virtual world for creating immersive and innovative games	<i>I believe that this kind of creativity and imagination makes the player's experience that much richer. With every game, there's a different set of experiences that are unique to each game, or at least each series of games. With the ability to create COMPLETELY unique objects, it adds a level of creativity that is unseen in any game. W_Chip_J6 [3187-3525]</i>
Metacognition about participating in another team's RPG game role-play from the player's perspective	<i>The real "learning" occurred in Thursday's class when I played as the victim I MEAN player. I experienced a very unique style of gameplay during the enactment of the team's roleplaying game and was also somewhat surprised by the game's solid structure and smooth gameplay B_Nathan_J6 [1091-1365]</i>
Communicating confidence about what an actual game needs	<i>Working with a team to make a prototype rpg game made me think in both ways. It made me think of how all the elements of the game type come into play and how they would all work out in a real game and how that game would be played. W_Jack_J7 [965-1199]</i>

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*Note 1.* <sup>a</sup>Phase I refers to 1<sup>st</sup> two and a half weeks of the team project, Phase II refers to the following 2<sup>nd</sup> two weeks of the team project, and Phase III refers to the last two and a half weeks of the team project.

**Reflective learning.**

This section describes how the environment was designed and facilitated to “Promote reflection to enable abstractions to be formed (Herrington and Oliver, 2000, p.6)”, and how the students experienced the practice of reflective learning in the virtual world. It also discusses rationales as to why these findings are noteworthy. The learning environment was rich with opportunities for reflective learning that were integrated within the game development course. Students had opportunities to deepen their understanding within their teams, as a class, and individually.

***Opportunities for peer reflective learning and self-reflective learning.***

The virtual world afforded rehearsal (game prototyping) and performance (game testing) for real-time reflection among peers. A random student from the class was chosen to play another team’s simulated game-play. The reflective learning strategies included real time storyline adjustments in reaction to ‘the player’ testing the game and vice versa. The game-play was recorded via machinima (screen recordings of Second Life). Post mortem, cross-team peer evaluation and self-evaluation allowed students to reflect on game development concepts and on how their games could be improved in their next iterations. This activity closed the loop on the team project by asking students to reflect and evaluate peer work, review peer feedback, and subsequently evaluate their own team’s work.

Class-based reflection was facilitated through class chat discussions and sharing class assignments. Examples of individual reflection included assignments where students reflected upon their own role-play characters and reflected on their personal gaming interests. From Instant Messaging conversations and interviews, approximately 15-20% of the students were

exploring the vast virtual world of Second Life beyond class boundaries and expectations. Their journaling about incidental learning experiences was also a form of self-reflective learning.

***Five types and three levels of reflective learning.***

In Table 4.1.12, reflective learning strategies were analyzed resulting in five different types. These included

- relating one-dimensional statements that lack adequate examples;
- observing virtual world surroundings and experience;
- expressing feelings in relation to the topic;
- metacognition (sharing insights about how one learns) or connecting the topic to personally relevant experience; and
- linking topic examples to real-world contexts, or adding topic-relevance to class knowledge.

The following is an example of a student reflection:

*“I would like to add that in many games the player character is completely silent, even if the character participates in dialogue options, and this is done so that the player themselves sees themselves as the player character.”- Storm \_J3 [1253-1522]*

Student reflections were further analyzed with respect to a recent study which used a constructivist-based self-reflection rubric (Rinke et al., 2009). The leftmost column of Table 4.1.12 categorized the level of reflection into low, medium, and high-degree of self-reflection. Ideally, the student reflections would have exhibited more medium to high degree of self-reflection. It was inferred that reflective learning might not have been adequately integrated into their K-12 or college preparation curriculum.



***Lack of familiarity with reflective learning.***

The students expressed themselves through a weekly reflective journal. The journal included prompts about what was learned during the week, what new insights were gained about the virtual world experience, and about the state of the virtual world team work. After reviewing 75 reflective journal entries, it was inferred that the majority of Millennial students may have been baffled with the expectation to reflect upon their learning experience. Efforts were made to model and encourage reflection by the instructor and by the team leaders. It was observed, that this was not enough to affect change in what was perceived as an unfamiliarity or discomfort with being asked to reflect upon their personal learning experience or to write about it.

***Challenges with adapting to a reflective practice, difficult to assess.***

The instructor's review of reflective journals became a challenge because some students did not complete their journals or complete them on time due to the more open-ended class format. Students had to be constantly reminded that the journals were a part of course participation. Additionally, it was time consuming to read all of the journal entries and provide adequate feedback to each student. During focus group discussions, students related that they would have liked more feedback than they had received. They related that the instructor commented on two out of the seven journal entries for each student. Given that the journal entries were by their very nature idiosyncratic, it was also a challenge to grade them in a standardized fashion. A holistic rubric was used which measured completion, whether the examples given had adequate detail, and whether the new topic was connected in some meaningful way to the course, discipline, or personally-relevant experience.

*Slight improvement when structure and prompting added.*

A slight improvement in journal reflections was observed during phase II and III of the team project. This was partially attributed to the iterative adjustment of the journal template toward more structure. The modified journal progressed to one in which there was more guidance about reflection topics. The number of prompting questions also increased in order to ease the transition to reflective writing and its inherent lack of structure.

Table 4.1.12

*Theme Analysis: Reflective Learning Strategies in a Virtual World*

Degree of Self-Reflection	Reflective Learning Strategies	Examples
Low level of self-reflection	Relating one-dimensional statements that lack adequate examples	<i>Without a lot of experience in Second Life, I would have to say I haven't learned much about myself or inworld teamwork/projects. W_Chip_J1 [753-883]</i>
		<i>This weeks [sic] class session inworld could not have been enhanced. I did not learn anything about myself this week because of the virtual world. W_Jack_J3 [1671-1812]</i>
		<i>Something I find strange about SL is the obnoxiousness of the people inside. W_Chip_J4 [2006-2083]</i>
Medium level of self-reflection	Observing virtual world surroundings and experience	<i>What I learned about myself this week in the virtual world is that I have a lot to learn about second life. Just walking about and talking to people is not all you can do. You can create things, change your appearance, go to other worlds, it's all really fun. W_Bill_J2 [1782-2045]</i>
		<i>One major difference is the direct interaction with the teacher in RL compared to communication through text. This direct communication seems to have been cut for the convince [sic] of taking the class from home which is in no way a bad intention. B_Nathan_J2 [2558-2967]</i>
		<i>some people don't pay attention all the time because they are protected by the shroud of the internet. W_Bill_J3 [1336-1444]</i>
	Expressing feelings or personal reactions to topic	<i>...at times, awkwardness with people other than the students in the world outside our virtual classroom location B_Nathan_J4 [713-819]</i>
		<i>My favorite part from the various worlds would have to be the amusement park, just because of how much was there and the level of interaction within the park itself. The amusement park really showed how much can be done in the virtual world W_Jack_J6 [3385-3628]</i>
		<i>I was very anxious before the enactment...it does mean that you care more about it because if you're anxious, you don't want anything to go wrong. W_Chip_J7 [2830-3114]</i>
High level of self-reflection	Metacognition (sharing insights about how one learns) or connecting the topic to personally relevant experience	<i>I did care about my performance and I supposed because I was a bit worried that I didn't know when it would officially start it showed that I cared more because I wanted a good grade in the class. W_Jack_J7 [4214-4412]</i>
		<i>I do think that being slightly anxious prior to it means that we cared about performance, since our hard work was to be evaluated and given a passing or failing grade. W_Bill_J7 [4332-4545]</i>
		<i>I realized that I act the same as I do in real life. [R: In response to Journal Guide prompt about how they see themselves in a virtual world?] W_Bill_J1 [1278-1330]</i>
		<i>Most of the time when I don't participate in chat it is because I generally agree with what was already said and feel there isn't anything worthwhile to add that I can think of. So something that allows for widely varied opinions would make that less likely to happen, and I would be more likely to participate more in the chat. W_Storm_J4 [1400-1732]</i>
		<i>How my character represents me is mostly accurate other than the way he looks. W_Bill_J4 [1583-1661]</i>
		<i>I can use this new knowledge to help reinforce my own RPG with my own team. B_Nathan_J6 [1945-2023]</i>
		<i>I could have used IM myself because I wasn't entirely sure what to do during setup. W_Chip_J6 [1107-1210]</i>

	<p><i>Of course I was anxious; isn't everyone anxious before a major presentation? It's only natural. Everyone experiences anxiety before a big presentation even if they are 100% ready. (I am a prime example of this).</i>  B_Nathan_J7 [3492-3706]</p>
<p>Linking topic examples to real-world contexts or topic-relevance adding to class knowledge</p>	<p><i>I would add to the topic in class a section about Joseph Campbell and his teachings of archetypes in writings and relate that to the writing of video games compared to the writing of a novel.</i> B_Nathan_J2 [1512-1705]</p>
	<p><i>I would like to add that in many games the player character is completely silent, even if the character participates in dialogue options, and this is done so that the player themselves sees themselves as the player character.</i> W_Storm_J3 [1253-1522]</p>
	<p><i>Stories also become different when viewed from different perspectives because different people have different ideas and those ideas can enhance the story and changes will be made to better the story.</i>  B_Jiba_J3 [1461-1663]</p>
	<p><i>The player's reward was defeating the other contestants in the race. This was a more personal benefit than a "world peacetype" benefit.</i> B_Luke_J7 [1996-2137]</p>
	<p><i>I realized through this enactment that a lot of expectations come from the developer. They don't usually just make the game and throw it out there. They have to anticipate what the player will do and what interrelations with that player would make the game experience more fun.</i> B_Luke_J7 2<sup>nd</sup> [455-736]</p>

### **Collaborative learning.**

The following section describes how the environment was designed to “Support collaborative construction of knowledge (Herrington & Oliver, 2000, p.5)” and how the students experienced the practice of collaborative learning. Factors which might have enhanced collaborative learning as well as ones that might have inhibited it are described, along with interpretations were appropriate.

#### ***Initial teamwork idealism and the reality of working together - Not easy to all participate, yet balance each others’ input.***

Students were explicitly encouraged to build their teams during the first week of the virtual world project. As compared to the remainder of the project, positive ideas about working on a team were overwhelmingly shared. For example, Jack and Storm shared that communication, organization, and cooperation were important for teamwork to occur (Table 4.1.13). The initial extensive feedback was probably due to being specifically asked about it. When the game projects were role-played and reflected upon during the last two and a half weeks of the team project, it was interpreted that more genuine feelings about teamwork surfaced.

It was observed that the majority of the students did not have a clear idea of how to effectively collaborate in teams, how to lead creatively, and how to balance their participation with others’ input. This phenomenon is partially attributed to a lack of exposure to collaborative learning strategies in their pre-college experience. Luke was one of the only students to express the need for creative strategies for collaborative learning to take place:

*“This week I learned that creative thinking is needed in a team environment due to the fact that one person cannot do all the work themselves.”* – Luke\_J3 [1983-2265]

***Conducive to collaboration and a synthesis of ideas versus division of labor.***

The project goal was to develop a game which resulted from synthesizing the work of diverse perspectives, not to create a project that was merely a sum of its parts. In the following excerpt, Jack shared gaining diverse input through collaboration:

*“I learned about others ideas and feelings toward stories by interacting with my group.”*  
- Jack\_J2 [1765-1854]

Through the virtual world, students demonstrated differentiating what project tasks they completed based on their in-world affinities. For example, students who preferred building were building artifacts for their game. In focus groups, the majority shared that this contrasted the allocation of work which had occurred during face-to-face projects. It was inferred that for projects which occurred in the face-to-face environment, the group allocated tasks to students who had appeared most confident at completing them at the onset of the project. As such, the usual workflow consisted of a group getting together, assigning tasks, and when done, one person simply stringing deliverables together into one project. In contrast, it was observed that virtual world tasks were progressively discovered and the division of labor fluctuated throughout the project. For example, one gamer shared how tasks were differentiated for his team within Second Life:

*“I found out how to find different types of locations in second life and save them while another [sic] team member used this information to search for some interesting locations.”* - Storm\_J1 [1906-2064]

***Team leaders modeling learning engagement and motivating their team members.***

Each of the teams had at least one person who identified himself as the team leader and who was looked upon as such by the rest of the team. One team had two members who led in

unison, where sometimes one took on more responsibilities than the other and vice versa. The team leaders were observed as modeling and encouraging their team members toward sought after behaviors. For example, the team leaders demonstrated help in collecting and synthesizing ideas of their team. The following statement was indicative of observed team leader behaviors, such as listening, taking initiative, and being dedicated to the excellence of the final outcome of the team project:

*“I learned by paying attention to others opinions and incorporating them with my ideas to make the best possible product.” - Bill\_J4 [1084-1206]*

***Team leaders developing or weighing down a collective vision?***

There was one team which appeared to have too strong of a leader. After his team’s focus group session, the team leader revealed in a tone of frustration that he could just not think of any further ways to engage his team. In fact, he confided that he was considering just doing everything by himself. This attitude may have inadvertently made it too easy for certain members of his team to sit back and be passive. Incidentally, this was also the only team out of four teams which exhibited a slightly negative attitude. It was inferred that too strong of a leadership style might have been overbearing for some team members, perhaps even slightly demotivating. On the opposite side of the spectrum, another team leader shared a strategy for achieving more cooperation:

*“I learned that keeping an open line of communication is a key in in-world teamwork. We met up before class this week in second life and got down to business with our work.” - Luke\_J4 [2306-2480]*

Yet another example of encouraging equal participation involved figuring out team member styles and communicating with them in the style or manner they preferred. For

example, one team leader, Derrick, was observed reminding one of his members about the focus group meeting through texting and calling him twice in a very friendly and non-accusatory manner.

***Challenges due to team members with low motivation, small teams, and a need for enhanced individual accountability mechanisms.***

At any given time, approximately three out of the eighteen students were minimally engaged. Thus, one of the team's numbers effectively dwindled into three active members out of four and another into three active members out of five. The two teams reported in their focus group sessions that they were at a disadvantage in comparison to the other two teams with had four or more members. Given the average of one student not being active within each team, it may be that teams should consist of at least five members and not be allowed to fall below four members.

The following is an example of a student justification for the fact that the team did not have their assignment when it was due (their team leader was not present and the students were relying on him):

*“He was absent one day and since he had our documents on his computer (since he has generally been the one who submits our team assignments) it was difficult to remember all the details of what we had previously done.” – Storm\_J3 [2046-2261]*

In this instance, the team leader appears to have taken the role of not only the leader but the note-taker, the organizer of project resources, as well as the one assuming the greater portion of responsibility for the project. Inferring from statements such as the one above, the inactive subgroup of students might have merely been logging on to the virtual world classroom and not fully engaging in team activities, up until the very end, when it was absolutely necessary to



interact. It is inferred that more methods which encourage team accountability could have been used, such as team checklists and team project milestone reports.

***Team behaviors and strategies mirror face-to-face ones, including stages of storming, forming, norming, however, more transparency and communication needed***

It was observed that the teams tended to act the same for virtual world interaction and during the face-to-face focus group sessions. Furthermore, accounts from interviews and Instant Messaging indicated that the quantity and quality of team interaction was equivalent between the two environments. Table 4.1.13 illustrates collaborative strategies which were commonly used in the virtual world. It could be inferred that the collaborative learning strategies that were useful in the virtual world could be both learned through earlier face-to-face projects or through subsequent face-to-face or virtual world projects. For example, one student had simply requested additional time to work on the team project:

*“Right now time in class to work on our project would help my team.”* - Luke \_J4 [2613-2681]

Though team behaviors were similar between face-to-face and the virtual world, certain behaviors were reported and observed as being more transparent in the latter. For example, when one of the games was being tested with a class guest, the guest was immediately able to identify which student had not sufficiently prepared for testing by noticing their game character's lack of development through dress and lack of prepared dialogue or actions. Lack of presence could also be indicated by not modifying an avatar or the 3-D environment for the game or by not providing other visual cues and actions. If the enactment had been face-to-face, the student could have easily adlibbed the enactment by relying on commonly used visual cues. In an

asynchronous discussion, they could have taken more time to come up with an answer without the preparation required for real-time interaction.

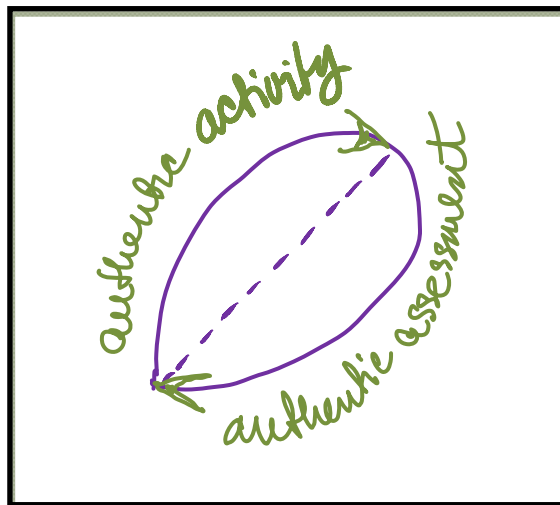
Table 4.1.13

*Theme Analysis: Collaborative Learning Strategies in a Virtual World*

Team Stages	Collaborative Learning Strategies	Examples	Obs <sup>a</sup>
<u>Storming</u>	Effectively communicating (tools e.g. optimized, strategies e.g. active listening, logistics e.g. training, time)	<i>I learned that team communication is important to getting the work done.</i> W_Storm_J1 [1043-1115]	✓
	Agreeing on team cooperation and project organization expectations	<i>I learned that teamwork, if used correctly, can be very effective and make a project a lot easier with the right amount of organization and cooperation.</i> W_Jack_J1 [1046-1200]	
	Collaborative learning mirroring teamwork found in achieving game goals	<i>I learned that teamwork is essential to the development of a game. Teamwork is also required during multiplayer games to accomplish goals.</i> W_Bill_J1 [1063-1203]	
<u>Forming</u>	Differentiating team member tasks based on in-world explorative interests throughout versus 'division of labor' at the onset of project	<i>I found out how to find different types of locations in second life and save them while another [sic] team member used this information to search for some interesting locations.</i> W_Storm_J1 [1906-2064]	✓
	Exchanging with and contributing to diverse perspectives	<i>I learned about others ideas and feelings toward stories by interacting with my group.</i> W_Jack_J2 [1765-1854]	✓
	Over-relying on team members, when roles not rotated or activities not requiring all to participate	<i>was absent one day and since he had our documents on his computer (since he has generally been the one who submits our team assignments) it was difficult to remember all the details of what we had previously done.</i> W_Storm_J3 [2046-2261]	✓
<u>Norming</u>	Creatively engaging members in what they enjoy doing and what they are good at	<i>This week I learned that creative thinking is needed in a team environment due to the fact that one person cannot do all the work themselves.</i> B_Luke_J3 [1983-2265]	96
	Peer-learning by listening and incorporating others' ideas	<i>I learned by paying attention to others opinions and incorporating them with my ideas to make the best possible product.</i> W_Bill_J4 [1084-1206]	✓
	Keeping an open line of communication	<i>I learned that keeping an open line of communication is a key in inworld teamwork. We met up before class this week in second life and got down to business with our work.</i> B_Luke_J4 [2306-2480]	✓
	Spending adequate 'time on task' as a team	<i>Right now time in class to work on our project would help my team.</i> B_Luke_J4 [2613-2681]	✓
<u>Performing</u>	All participating in making connections between all components to present an authentic final product	<i>The idea that everyone had to modify their character, create a dialog, create an object and collaborate in the enactments worked very well, giving the game much more authenticity.</i> B_Luke_J7 [3498-3681]	✓
	Understanding the necessity of teamwork (for an activity such as role-play) and valuing benefits of collaboration	<i>I was pleasantly surprised during our team's enactment. We seemed to get into character and take part in the world of "CarWars" as that character. I think this might be due to the sudden reality "hit". My team members realized that they must work together and complete a good RPG in order to do well in this class.</i> B_Nathan_J7 [3707-4024]	✓

Note 1. <sup>a</sup>Obs: The checkmark in the rightmost column refers to phenomena observed two or more times in relation to team collaborative learning strategies.

## Authentic Activities and Assessment



**Figure 4.1.21** Model of a Learner Engaging in Authentic Activities and Assessment

In Figure 4.1.21, the abstract model was created to illustrate the full elliptical process the learner completes in order to completely assimilate new knowledge. The learner, represented by a dot traveling along the eye-shaped model, works on authentic activities within authentic environments, and then back again practicing the same through authentic assessment. The dotted line represents the fact that the two reflect one another, and authentic assessment is simply a repeated authentic activity to demonstrate mastery.

### **Authentic activities.**

This section explains what was done to “Provide authentic activities” (Herrington and Oliver, 2000, p.5), what the students experienced in relation to the authentic activities, and discusses related interpretations.

***A variety of tasks and perspectives suggested for learning engagement.***

There were many different types of tasks that were a part of the activities that built toward the approximated real-world team project. Examples of these tasks and activities were summarized as part of the active learning strategies (Table 4.1.11). The use of Second Life facilitated simulation from a number of stakeholder positions. SL was conducive to enabling interaction through multiple perspectives and various roles. However, this had to be embedded in how the activities were designed. In the following excerpt a student shares wanting to see more varied virtual world activities used instead of text-based activities:

*“I think it would be important to include a lot of the animation and building in second life, and less of the text-related things.”* – Derrick\_J1 [8:21]

In another example, two focus groups indicated that they would have been interested in interacting more with Second Life residents in addition to their classmates.

***Need to tie activity significance to course and situate it with guidelines.***

For their initial class session, student teams were presented with a game in which they competed with other teams to demonstrate the extent of their virtual world assimilation and the status of their teamwork collaboration. Within the authentic learning environment paradigm, they were not supplied with all of the information right away. It was observed that approximately 75% of the students were reluctant to try out a new way of learning where the onus was on them to figure things out. Due to this incoming attitude, it may have been difficult to experience some of the activities as fun. When asked what would have helped to make the activities in Second Life more engaging, Nathan suggested:

*“It would’ve been good to have a few discussions about why we are using Second Life and what that means before we went into Second Life.”* – Nathan\_I2 [9:20-9:22]

More discussion about objectives, which may be reviewed in Table 4.1.22, and a more convincing rationale as to why Second Life and the authentic learning environment design were being used might have helped in getting student buy-in and situating the experience better.

***Conducive to a variety of simulation: authentic teamwork, real-world problem-solving, and game development experience.***

The environment allowed for the simulated process of working in a real-world game development team to develop a game together. The creation of the game project required design, development, testing (facilitated through role-play) and reflection toward enhancement; all of which would happen regularly in the real-world. Students had the opportunity to realize that games are not just for fun, rather, require well thought out components that seamlessly work together. Perhaps most importantly, students were exposed to the industry reality which measures the success of a game to how well its target audience takes to it, in this case, the ‘player’ of their test game. Students also experienced authentic social media through Second Life and thereby developed their virtual communication and collaboration skills.

***Need for progressive staging of real-world team project.***

The course sessions and activities were pre-planned. However, Table 4.1.21 illustrates the flow of what was actually observed during the three phase real-world team project. Despite the fact that the activities may appear stand-alone in Table 4.1.21, they progressively built one on top the other toward a complex, large-scale team project. In Figure 4.1.22, an activity is portrayed where the Blue team was role-playing their “Car Wars” game characters. The White team interviewed them about their characters’ relationship to the game storyline. Then, the two teams switched and the opposite team did the interviewing. This activity was more complex than

the activity which had preceded it. The students welcomed this activity even though it required more coordination amongst team members to portray a cohesive idea of what the game was about and more expression as to how their individual characters helped shape the game.



*Figure 4.1.22* Scaffolding Authentic Activity – Interview of ‘Game Characters’

***Projects resulting in unique approaches, interestingly--all with societal or environmental concerns.***

Figure 4.1.23 shows a snapshot of the “Animals” game project. The uniqueness of this game was that it was concerned with a world problem of animal genetic engineering in the hands of people unconcerned with the environment. The player’s quest was to save all the little animals that had been genetically re-engineered by the evil scientist. All of the teams took entirely creative routes in how they

- created their characters, assets, and environments;
- designed the player’s goals; and
- interacted with the player.

The variability is attributed to the open-ended nature of the project, which lacked an imposed structure, or ‘cookie-cutter’ tasks. It allowed the students to think innovatively and solve design problems based on their own mental models and personal interests. Interestingly, all of the game themes focused on some type of social or environmental concern, a characteristic said to be typical of Millennials.



Table 4.1.21  
*Domain Analysis: Real-World Team Project Stages*

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Domain Analysis: Sequence		
Included Terms	Semantic Relationship	Cover Term
	is a stage in a	real-world team project
<u>Phase I</u>		
<p>Week 1            Assimilating to the virtual world environment.            Team building toward an active game development team member.</p> <p>Week 2            Collaboratively writing a Role-Playing Game (RPG) game narrative and associated components such as theme, backstory, etc.</p> <p>Week 3            Designing personal avatar to reflect an NPC character of the RPG game.            Writing the character profile, a sample character dialog, and RPG game sample dialog-trees.</p>		
<u>Phase II</u>		
<p>Week 4            Creating and finding 3-D objects and/or scripts for NPC character assets (e.g. an arrow) and game environment 'look and feel' (e.g. a castle).            Practicing role-playing the team RPG game using personal avatars as NPC characters</p> <ul style="list-style-type: none"> <li>• visual communication of their 'look and feel' and assets</li> <li>• verbal communication through dialog; and</li> <li>• behavioral communication through their actions.</li> </ul> <p>Week 5            Designing and developing an RPG game segment from the narrative with player goals, rules, choices and/or level options.            Choosing and/or developing additional assets and environments and other game components (e.g. mechanism for accumulation of points) to role-play a segment of the RPG game.</p>		

### Phase III

#### Week 6

Continuing week 5 activities. Optionally scripting objects and/or animating characters.  
 Prototyping (role-playing) RPG game with random guest players.  
 Revising game based on recommendations and reflection.

#### Week 7

Prototyping RPG Game by role-play of personal avatars as NPCs with a Player who is randomly-chosen from another Team. (The final 20 minute live game segment is videotaped through the Player's camera viewpoint.)  
 Evaluating the game in the role of the actual or potential player and/or client.  
 Reflecting on the experience and writing a reflection about their team's enactment and other teams' RPG enactments (connecting it to course content--what worked and what didn't and why, with suggestions for the next iteration).



**Figure 4.1.23** Authentic Activity - Role-Play of “Animals” Game

*Different authentic problems may be embedded in the activities.*

The authentic problems which were embedded in the activities included

- real technical problems (e.g. How do I maximize the graphical capabilities of SL given my hardware limitations?)

- incidental problems (e.g. How do I ban the intruder interrupting our class session?);  
and
- design problems (e.g. How do I create a 3-D two storied maze quest for the player?).

Students solved challenges which often come standard with new technologies, such as

- created customized frequently asked questions when the available ones did not fit their specific needs;
- worked around the difficulty of hearing voice chat by transcribing mini lectures;
- figured out how to quickly change privacy settings; and
- solved peer technical issues through actively trouble-shooting via Instant Messenger.

Solving technical problems was especially topical for this course as the majority were computer science majors.

***Co-creation and role-play activities especially conducive to authentic learning environment engagement.***

Students co-created game components to make the game visually actualized, immersive, and contextualized. Role-play of the developed game precipitated ‘learning by doing,’ allowing future game developers to inhabit a game. It was observed that the game team co-creation and the game immersion through role-play experience strengthened the need for each of the game components, as well as the need for the alignment of the game components. How well everything was aligned directly influenced how believable the game was to ‘the player’ testing the game and to the students when they evaluated the game.

**Authentic assessment.**

This section explains what was done to “Provide for integrated assessment of learning within the tasks (Herrington and Oliver, 2000, p.6)”, what the students experienced in relation to authentic assessment, and discusses interpretations where appropriate.

***Outcomes achieved for real-world team projects.***

As shown in Table 4.1.22, all of the teams achieved team project learning objectives. The learning objectives were that students collaborate in the virtual world, work effectively in teams, demonstrate basic game creation skills by using narratives, characters, game design components, demonstrate 3-D modeling, evaluate peer game projects, and reflect on how their projects related to successful game development. Additionally, the student final exam scores on ‘items related to the portion of the course facilitated through SL’ was equivalent to their scores on ‘items related to the portion of the course facilitated face-to-face.’

Table 4.1.22  
*Authentic Assessment - Checklist for a Real-World Team Project  
 in a Game Development Course*

Learning Objective	Purple Team	White Team	Red Team	Blue Team
Collaborate in a virtual world as a learning environment	✓	✓	✓	✓
Work effectively in teams	✓	✓	✓	✓
Use characters to build game narratives	✓	✓	✓	✓
Demonstrate creation of basic game design components e.g. backstory, goals, rules, interactivity	✓	✓	✓	✓
Demonstrate 3-D modeling of artifacts	✓	✓	✓	✓
Construct a game segment and test it (role-play)	✓	✓	✓	✓
Describe how computer games are developed	✓	✓	✓	✓
Self/peer evaluate game projects	✓	✓	✓	✓

In Figure 4.1.24 below, the game project “CarWars” was a completely unique design solution when compared to “Animals” game yet both games met the project objectives. “CarWars” was unique because some of the personalities changed during gameplay, the player needed skills in car racing, and there was interaction with the student-scripted radio object. In this game, populated by good and evil cars, the scripted radio was used to summon the ambulance car if a good car got hurt by the evil “Grime Gang” cars. In effect, the students actually had three levels of representation including their

- avatars
- game (NPC) characters (by their dress, dialogue and their actions); and
- 3-D cars that came to life in the game (working in unison with their NPCs).



**Figure 4.1.24** Authentic Assessment – Role-Play of “CarWars” Game

***Assessment alignment to authentic activities and transfer environment.***

In the following example, students were asked to evaluate aspects of the “CarWars” game by answering the questions below:

- What type of fantasy world is portrayed?
- What was the Player's goal? Does the game make use of quests? Test knowledge? Require skills?
- What is the Player's reward? Is it a personal benefit such as a prize, points, or a ‘World peace-type’ benefit?

This assessment duplicated activities the students were exposed to already when they had evaluated the instructor’s example narrative. Evaluation of colleague projects was also an example of a skill they are likely to use in the real-world for their discipline. The following random set of student answers both had completely unique answers demonstrating that despite differences they could both be correct in an ill-structured or real-world project scenario:

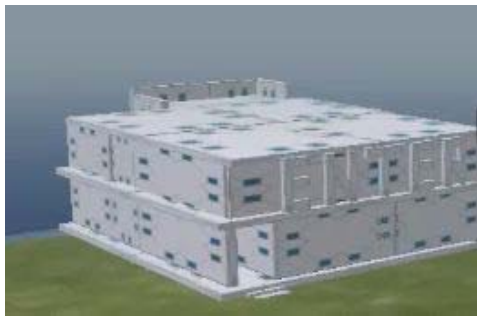
*“The environment was set to portray a foggy scene. The player's goal was to win a race. No quests. It did not test knowledge but tested the player's reaction skills. This was a more personal benefit than a "world peace-type" benefit.”* – Random student A answer, Evaluation Activity

*“A world with only cars. To defeat the ‘Grime Gang’. To win ‘The Tire’.”* – Random student B answer, Evaluation Activity

***Challenges due to identification of indicators, time, and lack of access to longitudinal data.***

The “CarWars” example showed how new knowledge could fit very differently into each student’s mental model. Student A answered the questions in a straightforward explanatory manner. Student B’s answers were brief yet he used more specific examples. There is no correct answer here. However, an issue that became evident through reviewing just two of the 18 responses is that a) authentic assessment needs to be carefully designed to produce outcomes that have recognizable indicators, and that b) authentic assessment may be time consuming.

Figure 4.1.25 shows an elaborate 3-D modeling component, which was undertaken by members of the Purple team – the maze. This showed some students going ‘above and beyond’ project 3-D modeling and fantasy world requirements. The “Sam and the Dragon” game included diverse fantasy worlds such as another university’s living room, a mountain cave, an elaborate maze, a sky house, and an underwater dragon lair. To save ‘the Princess,’ the player



had to complete a number of different quests, each situated in a unique fantasy world. This team further differentiated their game by their distinctive use of quests which simultaneously quizzed the player about gaming trivia.

**Figure 4.1.25** 3-D Model of a Maze for the “Sam and the Dragon” Game Quest

As well as demonstrating mastery through team projects, it was also important to require individual demonstrations of new knowledge. This prevented students from the temptation to solely rely on one's team members. Also, everyone was given the opportunity to individually master content prior to moving on to new content. Figure 4.1.26 shows individual chair and table 3-D modeling projects in the class virtual world gallery. The students were also required to create individual 3-D modeling assets within their team's game. Individual assessment mimicked collaborative practice; it was also more organic than certain types of tests may be.



**Figure 4.1.26** Individual Authentic Assessment - Gallery of 3-D Models

***Need for further development of methods, tools, rubrics, checklists, and positive reinforcement strategies.***

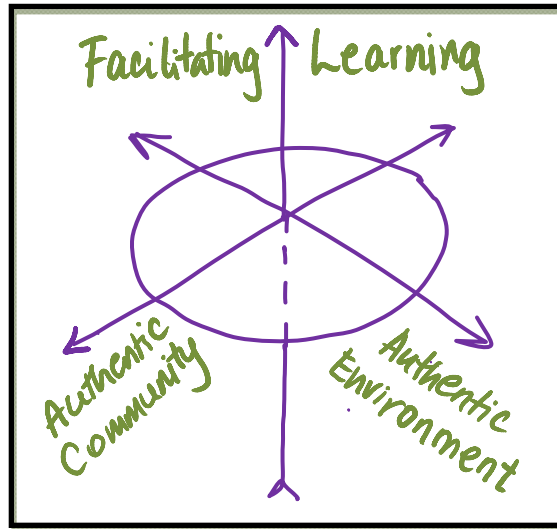
I asked Zach, who had created the chair that my avatar was sitting in (Figure 4.1.26), whether he felt he was in touch with his creativity. Quickly, I noticed that this had an effect on him: He seemed to open up by proceeding to tell me all about his artistic interests and the chair object he had created for the assessment.

*“Oh yes, I hate having tasks to do, I like having freedom...I like expressing myself through work...art, especially digital art, is also a passion of mine besides programming and software dev[sic]...like the chair for example we had to create a chair...the blue one, with the donut on top...I would have that in my house :P.” – Zach I1\_[9:06-9:08]*



As in the above example, authentic assessment within the task is not just a grade or even a filled out rubric, it is also the progressive feedback to the student as to how he or she is doing over time. In the real-world, it may correspond to turning in progress reports to be evaluated over a span of time by a manager or to gathering feedback from a community of practice.

### Authentic Context: Environment and Community



*Figure 4.1.31* Model of a Learner Co-Creating an Authentic Context

The abstract model in Figure 4.1.31 illustrates the process of creating a learner-centered authentic context. The learner is represented by a dot which is located all along the upwards arrow. The learner exchanges with her learning community and creates authentic projects that in turn increase the authenticity of the environment, represented by the expansion of the circle from the common center of the learner.

The time at which she grasps a set of new concepts, connecting them to her own mental models, is represented by her ability to further continue movement up the arrow. At these points in time, she may either travel upwards toward new knowledge sets or remain practicing at the achieved latitude. If she remains, she has the choice to strengthen new knowledge by continuing interaction with her learning community and completing more authentic projects. Both options

correspond to an increase of context authenticity, the first in terms of depth, the second in terms of breadth.

### **Authentic Context: Environment**

The class environment was created to “Provide authentic contexts that reflect the way the knowledge will be used in real life (Herrington & Oliver, 2000, p.4).” The following section describes how an authentic context was supported through the virtual world of Second Life (SL) and how the students reacted to it. It also elaborates upon any interpretations. The virtual look and feel of the classroom changed over the semester. Initially, it consisted of virtual chairs arranged in a semi-circle around a virtual PowerPoint screen projection. The structural changes which ensued due to the student interaction with the 3-D space and are further discussed in research question three, which specifically focuses on 3-D environment changes over time.

#### ***Benefits of rich environment, however resources and tools may compete for attention.***

The virtual world of SL had various unique tools such as the SL map tool which allowed searching other virtual areas, SL communication tools such as chat, or SL development tools such as the embedded 3-D modeling and scripting tools. These in-world tools were well matched to the game development subject area, especially as it was an introductory level course. Using the in-world tools exposed students to avatar modification, 3-D modeling and an awareness of scripting, which are all important for developing a game development knowledge foundation.

Game development resources were also available to the students such as in-world sites with free resources for game development, in-world sites with built-in games, links to online magazines and wikis on game development, a textbook, and a course Blackboard site (used as a

repository for class documents). The many different locations of the various types of resources and activities are illustrated through a spatial taxonomic analysis in Table 4.1.31.

Table 4.1.31

*Taxonomic Analysis - Locus of Attention in a Virtual World Classroom*

	Location	Related to Class Activity	Not Class Related
	Virtual world classroom:		
	Level: Sky, Ground-level, Underwater		
Virtual World	Encasement: On: Areas of 3-D objects e.g. sitting on a chair, In: Interiors of buildings and other structures e.g. in a 3-D castle, Out: Not limited by other 3-D objects e.g. flying	-Lecture and demonstration area e.g. classroom or auditorium -3-D building area e.g. Sandbox -Designated area for each team - Student Team project areas	-Area of classroom that is external to main class activity
	Area external to virtual world classroom area	Exploratory, task-related, or quest activities: -Area of the island external to the classroom -Virtual world external to the island the classroom is on	-Virtual world external to the university courses' area of the island -Virtual world external to the island the course is on
	Tools	- Communication media tools used in main class activity  - Other tools (other than communication media tools) used in main class activity	- Communication media tools external to virtual world main class communication  -Use of tools external to main virtual world main class communication
Physical & Online Environment (other than Virtual World)	Computer Screen (online)	-Learning management system e.g. Blackboard -Documents within applications e.g. Excel Worksheet -Email	-Chat client e.g. Skype -Web 2.0 tool e.g. Facebook -Online game e.g. WOW
	Computer Screen (other than online)	-Subject area application e.g. GameMaker -Document within an application e.g. Excel sheet	-PC game e.g. GTA -Files not related to class e.g. Photos
	Physical Environment (other than computer)	-Dorm/Home computing area e.g. computer, desk, chair, team texting - Paper-based resources	-Areas outside computing area e.g. kitchen -Mobile devices e.g. iPhone -Other distracters

The virtual and physical areas where class and non-class related resources and activities resided are summarized in the right two columns of Table 4.1.31. Viewing the environment this way, brings to the surface the complexity of learning in a 3-D virtual world with its plethora of omnipresent items competing for student attention. Student attention could be focused in any one or any combination of these at any one time. This may have affected some students more than others. For example, a focus group disclosed that one of their team members had attention deficit disorder and that sometimes it had gotten in the way of their work, however they also mentioned that this was the case both on-ground and in the MUVE. Participant observation confirmed that if students were not in a state of ‘flow’ or interested with the given collaborator or activity, chances of these other opportunities winning over student attention became even greater. As summarized in the second left hand column from the left in Table 4.1.31, students could be distracted through

- the affordances of the vast and rich Second Life environment and tools exterior to the virtual classroom;
- other online or computer applications on their laptop screens; and/or
- physical distractions.

***Environment may be confusing, yet it is also convenient.***

Since course resources and activities could reside in any of these places simultaneously, it may have been confusing to some students, especially at the beginning of the course. Suspension of disbelief to experience the classroom as an actual classroom may have been difficult in an environment that was not ready-made, rather, co-created by students. In an

interview, Bill compared Game Maker (the software previously used), to SL, to a predominately asynchronous experience through the Discussion Board, to face-to-face interaction:

*"game maker is really hard to do with multiple people...cause of it being its own program w/o using the language...I think its kind of cool that class is online, but I don't like that it is harder to understand what's going on...seeing as how I'm a visual learner, its just easier to understand people in person...second life is definitely better than discussion board posts because it is instant...not so much the avatars or models, but mostly the instant messaging for communication purposes...i definitely think that designing would be much better and productive in a room with a whiteboard... as people tend to pay attention when they are with others, instead of being distracted on the computer."* – Bill\_I1[12:00-12:07]

In summary, he expressed how Second Life was more conducive to collaborative learning than Game Maker software, had benefits of being online yet shortcomings of possible confusion, better than text-driven online education, however not as ideal for staying on task as working with others face-to-face using a tool such as a white board. It could also be inferred that tools such as the white board could be better integrated within Second Life.

A list of locations where course activities could be taking place and where course-related resources could reside is provided with examples in the middle column of Table 4.1.31. Students demonstrated being adept at multi-tasking (e.g. talking at the same time on IM, class chat and texting) and quick at accomplishing certain tasks such as instant messaging. However, as the course mimicked a real-world context, problem-solving became challenging for the majority of the students. The students might not have had adequate experience in these types of activities during their college preparation, i.e., mostly listening to the teacher lecture, completing worksheets, in-class reading, etc. It could also be that their personal background tended to make them uncomfortable with ambiguity.

***Open-ended context requires personal initiative, research, and problem-solving skills.***

Providing students with the resources needed was not a problem, but inspiring them to explore and use them was. This was attributed to undergraduate students not being used to open-ended environments within formal educational settings, which required

- initiative to figure out a viable project solution
- research skills to gather the needed resources wherever they may be; and
- logical thinking to propose a sequence of steps toward completion of a project.

There were a number of students who were not very motivated to begin with, as evidenced by statements that were made about them by others, which extended to when they had been in a face-to-face classroom. It was confirmed through interviews and IM that this set of students did not participate prior to using Second Life either. During the first focus group, a question was raised about low participation. Wes replied (Researcher Observation (RO): said in a tone that was a tad defensive):

*“Well, about the whole participation thing—Just to be fair, that’s the whole—how it is now, it’s basically how it was during class.” - Wes\_FG1[pg 2]*

***Gamer reticence toward Second Life.***

Gamer students had an initial reticence toward the environment, and some continued to have a bias throughout the course. They found Second Life to be a subpar platform when compared to their online games. A majority of the students had gaming backgrounds and as a result were exceptionally proficient at navigating through a 3-D space and communicating via similar communication tools. They had grown accustomed to them from an early age. The majority of gamers commented that it was frustrating that Second Life was not as smooth-



functioning in comparison to their gaming experiences. This was partially attributed to the fact that the university laptops did not have an ideal laptop graphics card to support the real-time SL graphics. On a few occasions this caused glitches with the technology and resultant interruptions. Even my computer froze a few times, after which I logged back on to Second Life and missed approximately a minute or two of class time.

***Frustration with others' abilities in communicating and navigating in environment.***

Students expressed a wish that the instructor and I were more comfortable with using the virtual world for communication and navigation to the extent they were used to it. Even though I had spent at least 200+ hours in-world in preparation for the research study, the fact that I was of Generation X and did not grow up massively surrounded by digital media or playing games were factors for the disconnect. In the following example, as Derrick expressed the inadequacy of the current hardware, he seemed to suggest being unsure of my proficiency to follow him in the chat interview. Hence, he inquired whether I would have difficulties with understanding his typing because he was a fast typer, additionally pointing out that there will be a log of our conversation (Researcher Observation (RO): presumably, if I were to become lost in our chat?):

*“you're not using a microphone are you?...I don't have one...tablet pc?...ohhhno...that won't run second life...is the issue that it's difficult to understand if it's typed?...i can type pretty fast so it should be fine and second life can save a log of conversation.” – Derrick\_I1[17:34-17:35]*

With respect to navigation, in my role as ‘the player’ testing the Purple Team’s game quest, I was to navigate through an elaborate 3-D maze that the team had created. Though I could sufficiently navigate for day-to-day virtual world interaction such as going up a flight of virtual stairs, teleporting (virtual world travel from one set of slurl coordinates to the next),

flying while following someone, etc., I kept getting stuck within their maze, bumping into walls, and over and over revisiting the same areas. I experienced a completely disorienting sensation, and then Derrick remarked how it was obvious that I'm not a gamer. My navigation skills were insufficient in comparison to those of gamers who had spent countless hours speedily navigating through 3-D game levels, some of which had complicated maze-type components.

***Technical skills expected of instructor; otherwise, another reason to lose attention.***

The instructor was of the Baby Boomer generation, however willing to take on teaching in SL with a very open and positive attitude. Along with me, she piloted Second Life with the previous year's game development class. Nonetheless, students in the current study exhibited impatience and gave suggestions such as the following for improving the Second Life experience:

*" i wish the instructor was a faster typer...i guess that classifies on how to make sl better." – Bill\_I1 [13:26-13:27]*

The extra assimilation time needed by the instructor for certain types of activity might have resulted in some slowness in class session sequencing. In particular, both the gamers and students who exhibited low motivation found this frustrating. It is inferred that this phenomena added to the temptation to become entrapped in activities which were not class-related. A list of example non-course activities, which could have been taking place, and locations of non-course resources is presented in the rightmost column of Table 4.1.31.

***Virtual world presence harder to gauge than face-to-face, easier than "online only".***

Though students reported that playing games on laptops was customary during class-time in both Second Life and when they were in their face-to-face classroom, the fact that SL is an

online environment added a shroud of anonymity. For some, this was an opportunity to escape from accountability for paying attention in class. For example, in a face to face classroom, a student could be playing an online game without being noticed by hiding behind their laptop screen. Sooner or later this would become visible, i.e., if the instructor walked around or just noticed the student's facial expression vary in the direction of the screen as opposed to the class activity. In a virtual world classroom and online environment in general, a student could be playing an online game more easily without the instructor or others noticing whether he or she is on task. One student alluded to the online anonymity in a 3-D virtual world. I asked Nathan about one of his journal entries where he mentioned feeling awkward with some people outside of class:

*"well, obviously, the mature content people...and you never know who is on the other side"* – Nathan\_I1 [11:21-11:22]

***Undergraduate discomfort with different methodologies and environments.***

The initial lack of acceptance toward a real-world learning context appeared to be linked to the students' already established concept of what higher education might be like. Resistance appeared to be further linked to not seeing a fit between their idea of a game development course and the different approach to learning about game development, authentic learning methodologies, and the use of Second Life. Very few students approached the course with exploration and a sense of play, as they might have another not educationally-related social media. It is as if students could not transplant or visualize the element of play with learning at a university setting.

It was observed that the students who exhibited curiosity, initiative, and leadership found the Second Life classroom environment to be engaging overall. Types of learners are addressed in more detail through research question two, where the focus is specifically on learner types for the current study’s game development course. Towards the end of the course, the majority of the class began to experience increased learning engagement and positive possibilities afforded by a flexible and rich environment (Table 4.3.31, Phase III). This coincided with the time when it became critical for the students to be present and to participate. It was also particular to the nature of co-creation and role-play activities. The initial rise, the subsequent fall, and then rise again phenomenon of learning engagement is addressed in research question three which explores the effects of the media over time for the current case study.

**Authentic Context: Multiple Roles and Perspectives**

This section explains what was done to “Provide multiple roles and perspectives” (Herrington and Oliver, 2000, p. 5), what the students experienced in relation to the diverse roles and perspectives, and discusses interpretations.

Table 4.1.32

*Taxonomic Analysis - Multiple Perspectives and Roles*

Taxonomic Analysis: Strict Inclusion		
Included Terms	Semantic Relationship	Cover Term
Mini lecture - Student listening	is a type of	class perspective
Activity-embedded - Interviewee Interviewer Evaluator (evaluating instructor story and peer games) Debater		

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Project-embedded -	
Game developer on a game development team	
Game player testing or reviewing game	
Role-playing non-player-character (NPC) in game	is a type of
More identified with –	team role
Tech help	
Advisor	
Researcher	
Leader	
Leader’s assistant	
Less identified with –	
Note-taker	
Devil's advocate (Conversation starter)	
Facilitator	
Reflector	

---

Table 4.1.32 displays the taxonomy of the types of perspectives and team roles found in the class. Learner types that emerged in this study’s game development course, with respect to their perspective about virtual world learning, are analyzed in detail under research question two.

***Multiple perspectives embedded in activities, allowing for empathy, socialization.***

Class perspectives are summarized in the middle area of Table 4.1.32. The availability of different perspectives, embedded within the design of class activities and projects, allowed students to experience different viewpoints. This required student immersion and student-student interaction. It was through access to different perspectives that students developed new understandings, some of which may have led to enhanced empathy and socialization. In the

following example, Jiba reflects on the use of different perspectives and the results that may have on changing a narrative:

*“Stories also become different when viewed from different perspectives because different people have different ideas and those ideas can enhance the story and changes will be made to better the story.”* - Jiba\_J3 [1461-1663]

***Variety of team roles students identified with, however, guidance and rotation needed.***

Team roles the students identified with are summarized on the bottom portion of Table 4.1.32. The upper list of team roles are ones with which they identified with more as compared to the lower list of roles. It is interesting that the ones having to do with communication were less identified with.

Team roles allowed students to take on different roles in class activities and complete different types of tasks within their team. It allowed team members to practice a variety of social and communication skills depending on their role. In certain situations, it also led to a deeper exploration of group dynamics and power relationships. The different roles did not notably rotate which probably did not allow everyone an opportunity to experience a variety of team roles.

***Virtual world socialization external to the classroom similar to real-world socialization.***

Incidental learning also took place due to the nature of the open-ended virtual world. For example, Sarah (away from the safe environment of the virtual classroom) was often minding her own business and as accustomed to--traveling to new places. She confided in me that once she landed in a private residence which was unknown to her. Upon landing, the owners of the private virtual house property, a man and a woman avatar, proceeded to run after her and yell:

*“GO AWAY! This is private property!”* – Sarah\_I2 [quoting in-world residents]

We were using voice chat and her voice appeared quite distressed over the incident. It was probably not due to the fact that they did not allow her to stay, instead, probably due to the element of surprise and the manner in which she was shunned from the place. She shared with me, that since the incident, she looked more closely at the descriptions of the virtual places she teleported to (i.e., Were they private? Who inhabited them? Was the description of the land welcoming?)

***External influence on class may contribute to virtual world socialization.***

In the beginning of the course there was also an instance of an intruder upon our virtual classroom and we called this incident “the unexpected guest”. The incident ended up being a learning opportunity within the authentic learning environment. As captured in Figure 4.1.33, the unknown avatar intruder showed up naked, yelling belligerently, then driving a car back and forth while a virtual lecture was taking place. Then, he flew away, only to return back within seconds and yet again interrupt with more of the same. This lasted for approximately six - seven minutes.

Students figured out a way to solve the technical issue and ban the intruder. A good percentage of the students (all but two students) demonstrated maturity in face of the inappropriate behavior. They did not engage with the intruder or start any of the gimmicks he was probably trying to initiate. Instead, they continued on with their teamwork activity. As the instructor and I were in the process of banning the user, the students were quicker at this type of problem-solving.



*Figure 4.1.32* Multiple Perspectives - Unexpected External Guest

Subsequently, a few of the students, such as the student avatar in hot pink in Figure 4.1.32, began to experiment with questionable avatar attire. The incident prompted a discussion between the instructor and I, during which I was for reiterating to the students that even in the virtual world there is a proper dress code. In the beginning of class in SL this had all been explained and a set of SL guidelines distributed for the students to adhere to. The instructor, however, wondered whether our reiteration of dress code rules might stunt student creativity as they developed their NPC characters further. During our discussion we posed the following hypothetical question – “What would happen in the real-world if just because a flasher showed up in a work area, workers began to exhibit inappropriate dress?” After asking this question out-loud, it became obvious that this went beyond stunting creativity. The subsequent class session, the instructor provided students with a reiteration of appropriate dress code and guidelines in a college classroom setting.



**Authentic Context: Facilitating Learning***Needs beyond instructor's content expertise.*

In conjunction with the authentic learning framework, the instructor was encouraged to use modeling, coaching, and scaffolding strategies. Since this study was not focused on the instructor, the data about instructor strategies ensues from how the students experienced this aspect of the environment. During Phase III, reflection, the Blue Team focus group and the instructor were independently asked to rate to what extent nine authentic learning environment guidelines were employed in the course. Students indicated that they would have wanted to see more modeling, coaching and scaffolding strategies utilized in the course. This coincided with the instructor's own evaluation of the use of nine authentic learning environment guidelines.

**Modeling.**

The authentic context was designed to "Provide access to expert performances and the modeling of processes (Herrington & Oliver, 2000, p.5)." The following section describes the modeling of expertise that was available to students, student experience toward it, and interpretations where appropriate.

*Instructor example preferred over rubric as a roadmap for an assignment.*

The instructor modeled expertise by writing a role-playing game (RPG) game narrative of her own. Students were to use it as an example or a type of roadmap to learn from, even a work to critically evaluate. In their interview and focus group responses, students overwhelmingly agreed that the instructor's personal example was more useful to them than any of the other types. They agreed that it provided them with a model for writing their own narratives, even a feeling that they were collaborating with the instructor. When asked which they preferred as a

roadmap for completing their game narrative assignment, the instructor's example or the assignment rubric, students preferred the instructor's example. This is not to say that the rubric was not helpful as providing guidance, rather, student commentary seemed to suggest that they were less used to it.

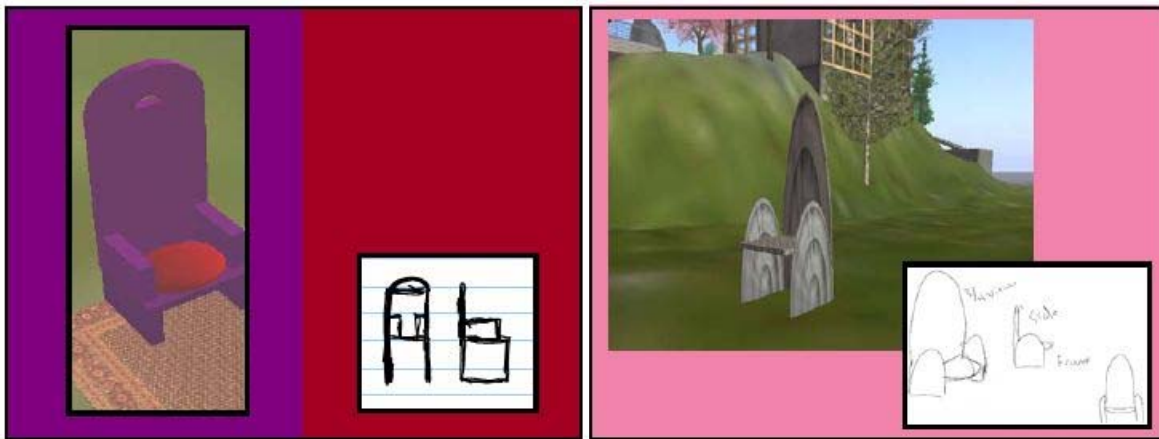
***Importance of leading by example for an authentic learning community.***

The majority of students were familiar with a paradigm where the instructor is always right. During the exercise where students evaluated the instructor's example RPG narrative, a familiar dynamic emerged. Namely, a few students challenged the instructor when critiquing her narrative. However, this was not something she appeared accustomed to. Students received a slight push back from the instructor which reaffirmed the status quo in which she was unquestionably right. The interaction transpired despite the fact that the students made valid points. This very small, however noteworthy incident demonstrated that though openness, equality, and collaboration had been encouraged, the authentic learning environment was challenging to adhere to in the way it had been introduced, and to some extent, implemented. It was difficult to foresee the students entirely changing their incoming behaviors to adopt new ones, if the instructor herself had doubts or difficulties with the authentic learning environment, for example, the equalizing of the playing field when she was being critiqued.

***Enhanced learning engagement with personal examples and integration of real-world examples.***

Other examples students received included model projects from last year's students. These provided a framework of what was possible by students who had already completed the coursework. Figure 4.1.34 below shows two examples that were made available from previous

year's student-created 3-D objects. However, examples the students reported were most useful to them were when the instructor herself shared her own expertise and facilitated discussion relevant to current real-world game development practices. Overwhelmingly, students wanted to be exposed to a greater quantity of these types of examples along with explanations about their relevance to course topics.



*Figure 4.1.33* 3-D Modeling – Learning through Examples

One forewarning about examples and their implementation is that they may lead to students taking ‘the least common denominator route’ by simply using the provided example as a template to complete their assignment. In these instances, they may skip thinking critically and trying different solutions on their own. For example, one of the team’s games initially had a narrative which was similar to the instructor’s. It may be that the students interpreted the instructor’s example as the only correct means to an end. Thus, structured methods, even providing examples, may potentially block creativity for certain types of objectives.

***Need to integrate the variety of learning resources and also increase usage***

Students were also encouraged to learn from real-world experts in the field, such as game design and game development professionals. Real-world expertise was accessed through different formats including articles such as “Effective Character Design” by a professional game designer and a lecture “Games as Art” by a professional game developer. Resources such as the articles and the lecture were underutilized by the students. One reason resources were not used as much is attributed to the lack of integration between the 3-D virtual world, the learning management system, and the face-to-face environment. The underutilization was also partially attributed to today’s students’ heavy work and school loads. For example, Nathan explained in an interview that he was disappointed he could not take advantage of the guest lecture.

*“I don't have time...I work.” - Nathan\_I2 [9:25-9:26]*

Some students were perceived as not putting forth an effort beyond minimal requirements, when it was actually their schedules that were getting in the way.

***Benefits of peer evaluation learning experiences.***

Another way students could learn from experts was when ‘the player,’ a gaming expert, tested their game. Through the live experience of role-playing the game non-player-characters, students anticipated and experienced in real-time what was missing and what worked well for the particular player. The game play was recorded (referred to as machinima in Second Life), through the perspective of ‘the player’ who was testing the game. Since the majority of students had gaming backgrounds (approximately 75%), they could also review the machinima from the vantage point of ‘the player’ with gaming expertise. They were to also review the game-play machinima ‘in the role of a game developer,’ reflecting about other team projects as well as their

own. Subsequently, they wrote reflective pieces about the games providing feedback to other teams about how the games met project criteria. Opportunities such as this, where students compared their grasp of new concepts to those of their peers, were interpreted as valuable learning experiences, allowing for common frames of reference upon which to build new knowledge.

Although students were strongly encouraged to use descriptions and examples in their peer evaluations, the majority of the evaluations were not very in-depth. Their reflections generally provided a synopsis of the game and included personal likes or dislikes of certain game components. Students who had an attitude of working for an “A (grade)-no-matter-what” (25% or less of the students) analyzed the games in more depth. Gamers, who were at the same time team leaders, fit this category by providing insight about their peers’ games, integrating course concepts, recommending ways the game could be improved, and relating the game to their personal study of game development.

The rationale for the peer learning not being as developed as it could have been was attributed, at least in part, to the lack of emphasis and credit associated with the writing of the reflective evaluations. Another observation, perhaps particular to the science, technology, engineering, and math (STEM) or technical majors, was that students lacked writing skills. Furthermore, writing is sometimes not perceived as crucial to the development of critical thinking in a technical curriculum so not as much emphasis is given to it as observed in this class. Correspondingly, interviews and assignments revealed that students who did well in reflective writing were either enrolled in a couple or more writing courses, independently writing, or had college preparation in writing. For example, Bill was enrolled in three other

courses which involved writing. Nathan, another student who demonstrated expressive and thoughtful reflective writing, shared his high school writing experience and personal interest in writing:

*“i dunno... i guess i just payed [sic] attention in my literature classes....i know i had mythology classes and we learned plenty about archetypes and such...actually i do a lot more writing now than i did then.”* – Nathan\_I1[1:33-11:34]

***Interaction encouraged with experts external to class.***

A portion of the students were motivated to explore the virtual world and network with other in-world residents based on their own initiative and curiosity. They ventured into Second Life beyond the requirements of the course, gathering resources and strategies as how best to proceed with their projects. All of the learning was not necessarily related to the course; a portion of it was entirely incidental. For example, Sarah confided in an interview that she began to spend 40 hours a week in Second Life. When asked what she did in Second Life and where she got her clothes and objects, she replied:

*“..mostly I picked up some.”* [Researcher Observation (RO): sensing some pride in the voice here] *Some clothes from them but I could put on somebody else's things...and, fooling around with objects.”* – Sarah\_I2

Sarah walked around, teleported and explored her surroundings without hesitation. She explored virtual schools, islands with free objects (freebies), virtual games within SL, etc. She explained that she could simply click on freebies and pay \$0 Lindens (SL currency), and then depending on what they were, use or wear them accordingly. Sarah found and brought back game resources for her team. For example, she brought back avatar skins of multi-colored mini animals into which the team members could change into to represent the genetically reengineered animals of their game.

***Possibility of social and behavioral benefits from virtual world exploration.***

Sometimes, she brought back items with her that had nothing to do whatsoever with class. Sarah and I were sitting in SL chatting about class and her travels during one of our interviews, and after some time passed, she offered me a virtual cookie. We continued our discussion and now each of us was having a virtual cookie. After some time had passed, something had changed; Sarah had become a bit less reserved than her usual self and more comfortable at expressing herself. The virtual exchange inspired me to grab some real cookies to munch on and I continued on with the interview, now mirroring my avatar. I then offered her a virtual soft drink to accompany our cookies. I truly sensed that she was both proud of her eclectic collection of objects and glad to engage in the trading of them. She followed up each exchange with stories of where and how they were retrieved. This example showcases how incidental or experiential learning may help in alleviating social anxiety, practicing oral communication, and in shaping of certain behaviors.

**Coaching.**

This section explains what was done to “Provide coaching and scaffolding by the teacher at critical times, and scaffolding and facing of teacher support (Herrington and Oliver, 2000, p.6),” what did students experienced in relation to coaching and scaffolding efforts, and discusses interpretations where available.

***Scaffolding and use of positive reinforcement encouraged.***

The extent to which coaching and scaffolding are provided depends largely on course design (i.e. do the activities progressively become more complex?), what is meant by ‘the teacher’ (i.e. does ‘the teacher’ refer to someone in the role of a lecturer, coach, facilitator,

mentor, artificial intelligence teaching agent, etc.?), and his or her teaching style. In the current course, the following activities were progressively more complex

- establishing a teamwork baseline;
- assimilating to the SL environment by navigating and modifying avatar appearance;
- exercising communication within the environment through class activities, creation of objects for the game and through team project teamwork;
- collaborating with team members to create a game (creating environments, dialogue structures, rules, background stories, etc.);
- role-playing and testing out games with a sample ‘player’; and
- reflecting on the outcomes of team games, explaining lessons learned, and providing suggestions for further revisions.

***Facilitating active, reflective and collaborative learning versus delivering lectures.***

For this course’s authentic learning environment, the instructor was advised not to lecture for long periods of time or for more than fifteen minutes at a time, in order to provide room for ‘learning by doing’ and ‘peer learning’. It was observed that this was harder to do for the instructor in the sessions for which she had a lot of expertise. Instructor behavior was attributed to the expert’s blind eye. Due to expertise in a subject area, the instructor may not be aware of key points of confusion or possible misconceptions that a novice may have. Long-standing experts may also not quite remember the way they actually learned in the field, rather, they might refer back to what they had to do in their own student classroom experience. For some teaching styles, it is conceivably challenging to switch from a lecture-style format, a style they have



adapted for the larger part of their career. To relinquish control and conceptualize the learning environment as one that is more participatory takes time.

For example, during the 3-D modeling class session, the instructor took a considerable amount of time (approximately  $\frac{3}{4}$  of class time) to explain and demonstrate building an object. The students expressed that it would have been more effective, in terms of learning engagement, if she had structured the class session to include others to be building along with her. If that had been the strategy, when students became stuck, they could have asked questions. Thus, it would have enabled collaborative learning and an opportunity for scaffolding for that class session.

***Requests for more ‘learning by doing’ and topic-related discussion that relevant to learner.***

Interviews, journals, and focus groups, overwhelmingly indicated that when the class “flow” switched from (learning by doing) to a lecture students appeared to be less engaged. This was not attributed to students not wanting to learn. Rather, it was interpreted that the students knew that they themselves would be able to learn better by either ‘doing things themselves’ or ‘discussing them within class,’ if given the opportunity. The phenomena is further discussed in research question three, where the focus is on specifics of what happened with respect to virtual world learning engagement over time. Within the context of this course, further support by the instructor was available at various times to answer questions through different means, such as instructor office hours, class IM, and email. This was seen as particularly useful for motivated students.

***Being experimental versus controlling leading to a richer learning environment.***

After one class session, an exploratory and fun exchange transpired during which the instructor exhibited flexibility. The instructor, Derrick, Sarah and I were sharing with each other what we had learned during our individual virtual world travels. Derrick had figured out a way to create scripts that would allow him to trap another avatar in a 3-D structure of his creation. This was objectively non-threatening though slightly unsettling when in the role of the avatar who is having to figure out a way to escape the entrapment, i.e., by sitting on a chair outside the structure or simply logging out of SL and logging back in.

Derrick proceeded to trap the instructor in a dome of sorts. It was fun because the instructor played along, trying out ways to come out of the structure while IM-ing us, then asking the student to share how he learned this and how it may be done. Figure 4.1.35 shows the four of us interacting with each other in an entertaining yet educational exchange

- Sarah, as a blue bear using one of her ‘tiny’ animal avatar skins (on the left);
- me, wearing a conservative black suit (standing between Sarah and the dome);
- the instructor (stuck inside the dome); and
- Derrick, as a short blue monster (on the very right).



**Figure 4.1.34** Scaffolding - Learning through Play

***Effects on psychological and social feeling of presence.***

I can personally attest that for the first time I was trapped, it felt quite invasive to the feeling of one's personal space. When it happened to me, I was in a sandbox (SL building area) outside of class confines, whereupon a strange furry (animal-like avatar) approached with ongoing grotesque laughter. Before I could figure out what was going on, I began to slightly panic, finding myself within the confines of a scary looking entrapment. Though these types of experiences were definitely not a part of our virtual class sessions, they illuminate that one tends to psychologically identify with their avatars. I felt a greater sense of presence in the virtual world than I had ever felt within any other virtual conferencing collaboration tool or learning management system.

Incidentally, this was also the week the film "Avatar" came out. Sarah and Derrick appeared to be making a reference to "Avatar's" blue avatar characters. These personal avatars were simultaneously their non-player characters (NPCs) to be role-played in their team games. Sarah's interpretation was of a genetically-modified 'tiny' blue animal avatar searching for a cure. Derrick's interpretation was of a good-natured blue monster avatar on a quest to save the princess. Their choice of characters led to a discussion about what is socially relevant to them and intertextuality. We discussed Avatar, Monsters Inc. and Smurfs, all media with some form of supernatural blue actors.

***Benefits of critiques.***

Opportunities existed for coaching and scaffolding, which were built in as part of the progressive nature of the learning activities. These included interaction with expert peers, guests, in-world residents, etc. For example, guests with expertise in 3-D modeling and graphic

design attended a class session in order to prototype the team games. They were asked to provide feedback as how to best align visual components to the game. Additionally, they were asked to provide insight as to where the interaction could be enhanced, and provide other feedback about enhancing the games. The majority of interviewees and focus groups expressed that this was a helpful and engaging class session. They shared that it was beneficial that they were provided with real-time additional perspectives, insight into possible game project discrepancies, and suggested improvements.

***Need for being personally invested in coaching and responding with meaningful feedback.***

In my interview with Bill, we spent some time building a table together. It was easy to get him involved in solving the problems of building and to answer questions which came up that he was unable to solve. At these junctions, I provided just enough information for him to solve one small task, allowing him to become further engaged in solving the next aspect of the problem. Our communication was a kin to coaching an athlete or it could be described as facilitating a discussion. For the coach/facilitator, it was a skill that I realized came with a lot of practice. One had to listen carefully for things said as well as unsaid, to not interrupt, to ask follow up questions, to create opportunities with silence, to stay genuinely engaged with the student and activity, and then, also to be there upon need. This type of instruction appeared more conducive to one-on-one or small group interaction suggesting smaller courses through SL or the use of team projects.

***Encouraging participation through getting to know students on an individual basis.***

I observed that students who participated in the interviews had an advantage of a mentorship relationship. These students appeared more motivated, which I partially attribute to me showing them how the virtual world could be explored and used in diverse ways, guiding them in their projects, and providing them with positive reinforcement. The positive reinforcement was given when they created something toward their game or solved a problem, shared an interesting activity that they had completed in-world, or when they expressed themselves thus allowing others to discover them as unique individuals. Judging from the journals of those that were not engaged in the interviews, it became apparent that this type of holistic engagement was available to some of the other students only in the latter part of the course. Additionally, it was still not comparable to the engagement that I felt the interviewees experienced because they had the benefit of a type of mentorship relationship over a sustained period of time. The time element afforded the ability for the student and mentor to compare development from beginning to end.

***Creating an open atmosphere for peer coaching.***

In addition to the instructor, the guests, and the participant observer researcher, it was also customary for the team leaders to coach their team. They encouraged and helped their team members to participate and express themselves. For example, in Figure 4.1.35, one of the students took the lead in modifying his avatar to reflect the shady and unusual punk-like characters that inhabited fair grounds of their game 'Rides.' As their game was situated in a fair grounds context, the characters were made to fit the environment. It was interesting how, almost

by osmosis, the other team members quickly took up the challenge of their team leader, and created their own versions of punk-like characters for their ‘Rides’ game.



*Figure 4.1.35* Coaching – Learning through Peer Osmosis

In summary, creating an authentic context is possible in environments such as Second Life; however, a lot depends on the status quo and locus of authentic resources, as well as the composition and culture of the learning community.

The cultivation of an authentic learning environment which supports subject area knowledge leaps and subject area practice from the learner’s perspective is modeled in Figure 4.1.41. The abstract model illustrates the learner within an authentic learning environment in a virtual world based on the current case study. The learner is represented progressing through the authentic activities and assessment loop, mastering content using the three learning strategies and then ‘Bloom’-ing into a flower-like shape, thus fully grasping a new set of knowledge and

making a knowledge leap into a more complex environment and community. The model integrates the three models that have thus far framed the case study scene from the learner's perspective.

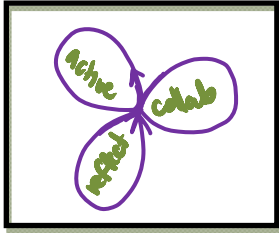


Figure 4.1.12  
Support of authentic learning strategies

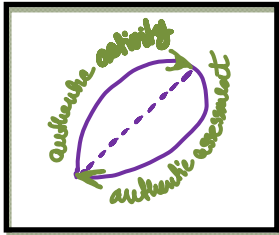


Figure 4.1.21  
Design of authentic activities and assessment

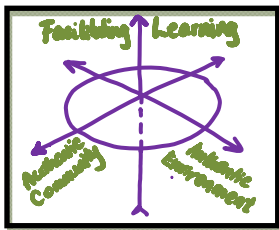


Figure 4.1.31  
Creation of an authentic context  
through environment and community

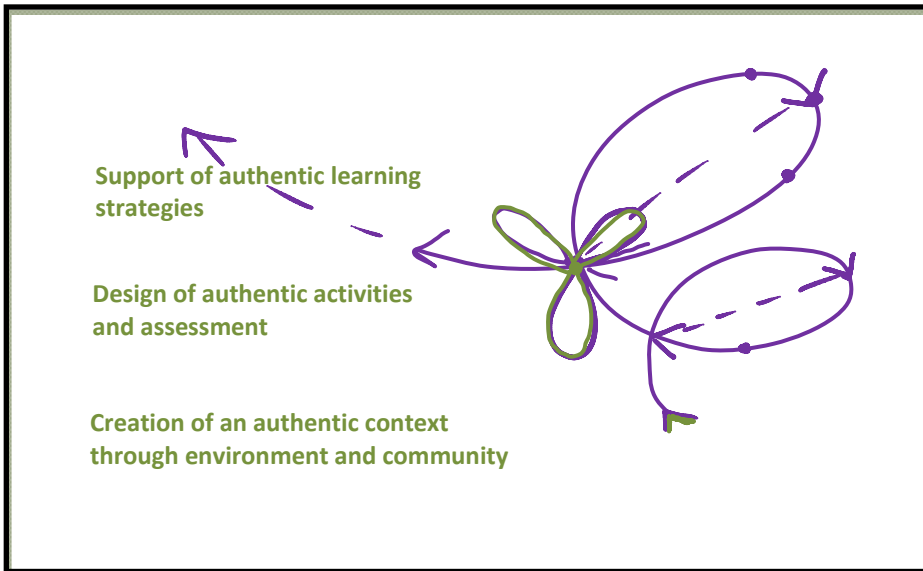


Figure 4.1.41 Model of Learning in an Authentic Learning Multi-User Virtual Environment



## **Research Question II Learners**

### **Millennials in a Game Development Course and their Perceptions about Virtual World Learning**

The second research question was: What unique characteristics did Millennials in a game development course exhibit when learning was facilitated through a virtual world which utilized an authentic learning environment framework? The unit of analysis for research question two was the individual. The research question was parsed into two parts, each with its respective objectives:

Research question 2.1: What were Millennial learner types of a game development course and how did the learner types differ from one another?

Objective 1: Identify learner types

Objective 2: Describe characteristics of the team leader/gamer type

Objective 3: Describe characteristics of other learner types

Research question 2.2: What factors might affect authentic learning engagement in a virtual world?

Objective 1: Identify learning engagement challenges (for learner types other than the team leader/gamer type)

Objective 2: Identify how learner types fared with respect to factors which might affect engagement within an authentic learning environment through a virtual world.

### Millennial Learner Types of a Game Development Course in a Virtual World

Table 4.2.1 displays the learner types found within a game development course facilitated through the virtual world of Second Life. Use of domain analysis found the following learner types to be unique categories of students present in this environment: gamer/team leader, female non-gamer, gamer, non-gamer, underrepresented student, and low motivation student.

Table 4.2.1

*Domain Analysis - Millennial Learner Types of a Game Development Course in a Virtual World*

Domain Analysis: Strict Inclusion		
Included Terms	Semantic Relationship	Cover Term
Gamer/Team Leader Female Non-Gamer Gamer Non-Gamer Underrepresented Student Low Motivation Student	is a type of	Millennial learner of a game development course in a virtual world

For further analysis, a vignette was constructed by creating archetypal examples of what the different learner types communicated about their virtual world learning experience. Table 4.2.2 is a vignette of the different Millennial learner types from the current study's game development course which was facilitated through a virtual world.

Table 4.2.2

## Vignette Analysis - Archetypal Millennial Perspectives on Learning through a Virtual World

Learner Type	Archetypal Perspective
Gamer/Team Leader	<i>"I played all kinds of games. I mean learning itself is serious play. One of these days I'll just be like working and it'll be another kind of gameplay."</i>
Gamer	<i>"Look, it's not a cool Second Life technology in our classroom...it's just a subpar game, if anything."</i>
Underrepresented Student	<i>"arghh...you know what? I agree. Sometimes I miss what up anyway and now - with this added technology...it's like just another barrier."</i>
Non-Gamer	<i>"I don't know...I think having class here is kind of interesting – like, sure it's not all set up like a game or straight forward like a regular classroom, but same time - where else can you be so creative? I mean, look at her and that neat little totem."</i>
Female Non-Gamer	<i>"Oh, you mean this? Well, I made this little sculpture...and I picked up these wings while exploring. Here – put them on...wanna fly together to new places with free stuff?...well?"</i>
Low Motivation Student	<i>"Seriously? I could care less whether we fly in Second Life or sit in a regular classroom...I mean honestly, I'm just looking for a passing grade...wake me up when its over."</i>

**Characteristics of the Male Gamer/Team Leader and the Female Non-Gamer**

The following section describes characteristics and some inferred perceptions of the male gamer/team leader and the female non-gamer learner types that emerged from the game development course in the virtual world. The two learner types were participants who exhibited the most learning engagement as compared to the other learner types in the class. Data for the gamer/team leader and the female non-gamer were predominantly collected through two to three open-ended interviews per informer, totaling 12 interviews over a period of three months.

**Gamer/Team leader.**

The five male gamer/team leaders were chosen as criterion-based samples for the case study. In addition to exhibiting virtual world learning engagement in the class, they had been

playing games since an early age of approximately four or five. Furthermore, they continued to identify themselves as gamers. Another descriptor which was unique for these five students is that they were more likely, as compared to the majority of other gamers, to have diverse gaming genre interests, including role-playing games (MMORPGs), strategy games, first person shooter (FPS) games etc. They were not assigned team leaders; rather, they became team leaders within their teams. Out of the five identified team leaders across the four teams, three of the teams had one team leader, whereas one of the teams had co-leaders. Due to simultaneously possessing a gamer perspective and the team leader role, this subgroup formed a unique learner type referred to in this case study as the gamer/team leader.

Table 4.2.3 showcases representative examples of inferred gamer/team leader type characteristics. It was conjectured that these characteristics positively influenced the quantity and quality of their learning engagement in a virtual world environment. For that reason, gamer/team leader characteristics are also factors conjectured to possibly affect virtual world learning engagement.

For examples listed under characteristic one of Table 4.2.3, students who were most likely to be comfortable with ambiguity, breaking rules, and exploring multiple new approaches to solutions were gamer/team leaders. It was inferred that they were aware learning can be a challenging process; however, this did not deter them. When this subgroup of students did not succeed right away, they persisted with different solutions until they succeeded. It is conjectured that this type of attitude and behavior mirrored their multi-user online game personas. Since their gaming interests varied, it is likely that their generalist appetite toward achievement transferred to virtual world learning.

For examples listed under characteristic two of Table 4.2.3, the gamer/team leaders demonstrated an inclination toward creative expression and problem-solving. They also demonstrated a sustained accountability in both individual and collaborative creative expression. Additionally, when their team members were not coming through with team project responsibilities, the gamer/team leaders employed creative strategies in order to engage their team members.

According to highlighted examples listed under characteristic three of Table 4.2.3, gamer/team leader behaviors in the virtual world mirrored their behaviors in the face-to-face classroom. In the virtual world and the face-to-face environment, gamer/team leaders were resourceful. They also demonstrated initiative toward creating team synergy and working together toward a common goal. Other team members confirmed these observations during focus group sessions and through private Instant Messaging (IM).

Observations and gamer/team leader insights indicated, however, a need to step up leader communication as compared to what it had been during their face-to-face interactions. For example, gamer/team leaders reported they communicated more frequently in SL and that they used a variety of communication tools. Gamer/team leader learner types were also observed to be more likely, as compared to other students, to identify those who were in need of assistance and to provide them with guidance. It cannot be inferred at this time whether this was more due to a concern for the team grade or whether it was linked to a characteristic of generosity.

From examples such as those listed under characteristic four of Table 4.2.3, it was inferred the gamer/team leaders exhibited a strong sense of self-agency. This included being self-directed, willing to take risks, and putting in the extra effort. One example of taking risks is

that all of the gamer/team leaders readily admitted when they did not know something. The gamer/team leaders were also not afraid to celebrate their individual uniqueness. For example, one student exhibited an unusual sense of humor without being shy about his idiosyncrasy.

For examples listed under characteristic five of Table 4.2.3, despite having just started their first semester in college, gamer/team leaders were already proactive in planning and acquiring skills toward their subsequent coursework and future careers. As such, they already possessed an inclination toward continuous learning. For example, one of the gamer/team leaders even sent me his resume and portfolio to look over and to provide feedback.

It is surmised that the coupling of these five factors rendered the gamer/team leaders more likely to be trustworthy in the eyes of their teammates, and that this had the positive feedback effect in contributing further to the gamer/team leaders' virtual world learning engagement. It is noteworthy, yet not entirely surprising, that the five characteristics paralleled the five virtual world learning engagement challenges experienced by the game development class at large. Table 4.2.5 lists the five challenges, with an additional 6<sup>th</sup> factor of gamer bias. As this 6<sup>th</sup> characteristic was not particularly widespread among the gamer/team leaders, it was not a factor which differentiated them from the other learner types and as such did not emerge as one of their unique characteristics in Table 4.2.3.

Table 4.2.3

*Domain Analysis - Characteristics of a Male Gamer/Team Leader Learner*

Characteristics	Examples
I.Comfortable with ambiguity	<i>"...there are no right and wrong, it's all about opinion, and being able to recognize other points of view...there are people...art/creative, there doesn't have to be an answer, its how you make it...you make your own answer."</i> - Zach Fpg10[9:03] <i>"yeah im horrible at spulling"</i> [RO: Nathan was not afraid of exhibiting his unique sense of humor or personality traits even though someone else might not agree or approve.] - Nathan B1pg12[11:53]
II.Showing interest in demonstrating creative expression and problem solving	<i>[R: how is your RPG2 coming along?] "ive got a few objects for my character...particulary[sic] a chopper."</i> [RO: Indicated excitement about matching his object to his game character.] - Nathan postB1pg12[11:54-11:55] <i>"I did enjoy the building more than anything else...I like designing things...I have a lot of experience designing things (stories, graphics, 3d models even)"</i> - Derrick C1[8:27] <i>"I took photo for a while in HS and loved it, and I really really would like to take digital arts/photoshop classes in college"</i> - Zach Fpg3[8:14-8:15] [RO: Demonstrated writing on-the-spot creative role-play character description with a twist] - Nathan B3pg7[10:04-10:06]
III.Resourceful and initiating collaboration	<i>"I got to know x and y in grp D pretty well...o and also z in grp A"</i> – Bill_I1 [12:31-12:33] Epg7 [RO: Observed that Bill was friends with other team leaders and 'A' students.] <i>"I learned that keeping an open line of communication is a key in inworld teamwork."</i> - Luke_J4 [2306-2480]
IV.Self-directed, willing to take risks, and to put in the extra effort	<i>[R: How come not many as self-motivated like you?]"...ehh I'm not sure."</i> [RO: Demonstrated positive attitude by confident comments about self, admitting when he did not know something.] - Derrick C1[8:26] <i>Our progress is slow, but I intend to improve it and the quality of our ideas right now.</i> - Bill_J3 [1449-1538]
V.Proactive in planning for future job skills and practical applications	<i>"I eventually want to work for either a computer animation studio or a video game company..."</i> [R: have you been to any informational interviews?] <i>"yeah ive been wanting to do that sor of thing over the summer"</i> [RO: Demonstrated further engagement in career planning by sending the researcher his resume and art portfolio on his own accord for feedback.] - Nathan B1pg10[11:48-11:52] <i>"I would rather learn 3Ds max [R: he is comparing it to SL modeling] because it's more useful."</i> - Bill E1pg8[12:40-12:41] <i>"I take my major seriously :) serious also comes with fun and humor though, people forget that!"</i> - Zach Fpg10[9:12]

**Female non-gamer.**

The female non-gamer was the sixth key informant of the case study. In addition to being the second most engaged learner in the class, she was chosen as the extreme case sample as she was a female and a non-gamer. She provided a contrast vis-à-vis the other five key informers who were all male gamers. Though Sarah had played some games in the past, she had not played games since an early age as the male gamers had and she did not identify herself as a gamer at the time of the study. Also, in contrast to the gamer/team leaders, the games she had played in the past, for example Pokeman and Sims, did not particularly vary in genre type. The participant researcher's female non-gamer experiences are also considered within this learner type to help corroborate the female non-gamer experience. That said, there is a generational difference between the Millennial female key informer and the Generation X female participant researcher.

In Table 4.2.4, the female non-gamers had two characteristics which coincided with those of the gamer/team leader type. Both the female non-gamer and the participant researcher female non-gamer exhibited interest in creative expression and problem-solving by modifying their avatar, collecting and creating an array of unique objects, collecting a suite of interesting landmarks (places visited and marked in SL), and through other innovative means. For example, as part of the final assessment, the students were to create 3-D tables and chairs. Sarah took the assignment a step further and created a table with a virtual pizza on it. She shared that her idea was to celebrate the end-of-class using the pizza as a symbol for a party.

One point of convergence with the gamer/team leader learner type is that the female non-gamer exhibited a proclivity toward comfort with ambiguity with respect to exploration. This



factor was needed for an open ended environment and the real-world team project. For example, Sarah ventured out to find artifacts and gear for her team's game. The female non-gamer learner type for this class differed from the male gamer/team leader in one aspect of her 'comfort with ambiguity'. Her comfort with ambiguity did not extend to breaking established rules. Two of the gamer/team leaders, Derrick and Zach, attested in their interviews that in their experience with female gamers there seemed to exist a certain gender difference in relation to how they approached breaking rules (Table 4.2.4).

In one example, when Sarah had mistakenly entered private property and the SL residents ran after her, she did not say anything back to the pursuers to inquire why they did not want her there or why they were pursuing her, leaving the premises extremely quickly. She also did not share with the class or her team or in her journal what had seemed as an uncomfortable experience. Her silence seemed to further suggest that she possibly shied away from situations that might leave her vulnerable. As it was, she had only revealed this to me well into the interview and at a point at which she seemed to have become more at ease with me.

Additionally, the female non-gamer had a characteristic in common with the underrepresented student, that is, a proclivity toward sharing and collaboration. In conversation about the types of games that she had played and what she had liked about the virtual world of Second Life, she appeared interested in collaboration and world-building environments versus more restricted and competitive ones. This coincided with the comments made by the male gamers who regularly came into contact with female gamers and non-gamers.

Table 4.2.4

*Domain Analysis - Characteristics of a Female Non-Gamer Learner*

Characteristics	Examples
I. Comfort with ambiguity	<i>[R: when asked does she consider anything gender-specific in SL? and why she had liked playing Sims more than other game genres?] "I think there are more things that appeal to females...the ability to shop, try on clothes, have pets, buy houses, go to concerts, etc." - Sarah A2pg3[middle]</i>
	<i>"I have a lot of Notecards...yeah, I got a lot of landmarks...they had nice buildings and nice objects. [R: Did you talk to anybody?] No. Mostly flew over them." - Sarah A2pg5[middle]</i>
II. Showing interest in demonstrating creative expression and problem solving	<i>[RO: Demonstrated creativity by creating not only an interesting table with an umbrella, but an open pizza box atop, which symbolized a party at the end of the class.] "I've always thought of girls as the more creative end....[R: another student said: "boys play more than girls?"]more games or they toy around with the rules more? probably the latter..." - Derrick C1[8:29-8:31]</i>
III. More comfortable with collaborative and world-building environments versus restricted, competitive ones	<i>[R: When asked what players and her did while playing Pokeman] "They travel with friends and collect animals. And, they have battles with animals to collect points for their owners...its evolution [R: how do they evolve?] Power, knowledge, and they just change to another version of animals." - Sarah A2pg4[top] [R: When asked about approximate % of females playing certain games] "for Call of Duty (FPS), I would say probably 10%, WOW (MMORPG) I would say 15%, counter-strike I would say 7 or 8% [R: % of females that occupy SL?] my estimate 20-30%" - Zach Fpg3[8:19-8:22]</i>

**Characteristics: Gamer and Non-Gamer, Underrepresented Student, and Low Motivation Student**

The following section describes characteristics and in some cases inferred perceptions of the gamer, the non-gamer, the underrepresented, and the low motivation student, all of whom were identified as learner types within this game development course through the virtual world of Second Life. The gamer, the non-gamer, and the underrepresented learner types emerged

from the study as exhibiting moderate virtual world learning engagement, while the low motivation student exhibited minimal engagement. Data about said learner types was by and large collected from participant observation, focus groups, and journals.

### **Gamer and non-gamer.**

To non-gamer Millennials, SL might have been an exciting new virtual world in which to explore, collaborate, and create. However, for the 75% of students who were gamers, there was a type of bias toward the use of Second Life (SL). They had already formed their framework for what constitutes a game. For gamer Millennials - SL was not unlike experiencing the environment of any other game where they are represented by an avatar and inhabiting a 3-D fantasy world. As the gamer entered the course, held in a place which fit neatly into a notion solely connected to play, it is interpreted that the gamer experienced difficulty in formulating a new notion of the virtual world, one where it is used for the purpose of formal learning in a higher education environment. It is as if the gamer's mind was already made up. After all, for approximately 15 years, s/he had been gaming in a world which looked much like the virtual world of Second Life, yet without having any linkage to formalized learning. It is further inferred that gamers were skeptical in reframing this ingrained construct of what a game is and is not, as well as in visualizing how a game could be created within Second Life. It is surmised that because this was the first time Second Life was being used by both the instructor and the students, it also affected these perceptions.

In comparison to the gamers, the non-gamers, approximately 20-25% of the students, were more intrigued by the possibilities of the 3-D environment, experiencing it with a sense of wonder and curiosity. One non-gamer expressed his enthusiasm in his reflection journal:

*“With the ability to create COMPLETELY unique objects, it adds a level of creativity that is unseen in any game.”* - Chip\_J6 [3412-3524]

He further shared his unbiased view by writing:

*“I think that the surprising thing was how well we adapted to the SL interface”* - Chip\_J7 [3115-3193]

Though more data are required, it is conjectured that for an upper-level class comprised of non-gamers there would have been more of a suspension of disbelief and less reticence with adopting the new technology of a virtual world such as Second Life.

Gamers did what they do best: they compared ‘what to them was a game’ to the games they were playing at the time. They asked questions such as: “How well does it perform? Is it as fast? How does it render graphics? What kind of controls, gear, and options are available? What are the payoffs? How does one level up?” From the gamer perspective, Second Life fell short when compared to the performance and interface slickness of most popular multi-user online games. It did not help matters that during the time of the study, the university laptops had a less than optimal graphics card, which in a few instances led to technical difficulties. Despite the fact that this was not due to SL, it may have contributed to some of the gamer frustration with the technology.

In terms of socialization, gamers appeared to have levels of belonging within gamer circles. The majority of the male gamers did not seem to find Second Life as the ‘in’ place to be. They perceived the environment as a home for obscure groups who did not have a life of their own. Some male gamers suggested that Second Life is a place for female activities such as shopping and talking. Their particularly competitive gamer attitude exhibited a zeal for retelling their recent gamer wins, exploits, and one upping each other on what is new in the gaming world.

For example, I observed two students who just found out that they had both played the Halo game. They quickly launched into a heated discussion as to who would beat who in Halo, eventually one of them exposing the other as a novice gamer right in front of me.

It is also possible that gamer bias was partially related to being accustomed to the goals and rules inherent in games, popular structures of game storylines, and familiar mechanisms for game interactivity. For example when Paul was asked what he disliked about Second Life, he answered:

*“No action. I like action.”* – Paul\_FG3 [676-678]

Although there is a perception of gamers being comfortable with ambiguity or breaking rules, it is important to consider the types of games for which this holds true as well as the types of rules that may be broken in games. The rules broken in first person shooter (FPS) games are fairly standard due to the nature of these games. In strategy games, for example Stargate, the rules pertain to war strategy. The majority of the gamers in the class played multi-player FPS games such as Call of Duty, Modern Warfare, Halo, Counterstrike and Battlefield Serious, and sandbox games such as Grand Theft Auto. It was inferred that though students were given the freedom to create an environment that worked specifically for them in the current study, the majority of the Millennial gamers did not readily take up the challenge to personally create a world of their own liking.

On the other hand, gamer/team leaders and gamers who had played a variety of games including massively multi-player role-playing games (MMORPGs), such as World of Warcraft(WOW), Mass Effect and Fable, and other games such as Final Fantasy and Legend of Zelda, had more of an affinity for the open-ended environment of Second Life and the real-world

team project. This is probably due to MMORPG games being similar to Second Life in terms of having less structure. A simulation within Second Life could be even less structured and more complex in comparison to any of the MMORPG games because it might be composed of a variety of game genres and environment types, which in turn could affect the outcomes of one's actions. The use of Second Life could also be the most static experience, all of which would depend on how the learning environment was designed and the learning facilitated.

### **Underrepresented student.**

The underrepresented subgroup of students exhibited a few distinct characteristics and behaviors differentiating them from the rest of the class. The subgroup included Jiba, one African American student and Marcel, one English-as-a-Second-Language (ESL) student. It also included a few students who were said to have learning difficulties by their peers, hence due to being underrepresented; they too fit this profile from time to time. Since both the participant researcher and the Millennial non-gamer female were underrepresented, their experience was also secondarily considered within this learner type. The inclusion of the female non-gamer was especially relevant when it came to the sharing and collaborative attribute. Researcher self-study was used for certain aspects of the case study, however, the research case as a whole was primarily concerned with examining a cross-section of game development course voices from the Millennial generation.

A point of convergence from the underrepresented minority experience in the virtual world was their tendency to reach out to others, to share, and to acknowledge differences. During phase I of the project, Jiba\_J1 [1708-1777] stated that he shared his ideas with his team. The word 'sharing' was seldom heard throughout the entire course. It came up once again during

an interview with Sarah, the only female other than me in the study. During phase II of the project, Jiba \_J3 [1461-1663] celebrated the learning which results from differences. Toward the end of the team project, during phase III of the team project, Jiba \_J6 [1895-1955] again reached out to his team to solicit more collaboration. In comparison to the majority of students, students who were underrepresented appeared to reach out more to others. This might be related to some of their own difficulties with being accepted within a majority of white middle-class male students, who were also not very expressive themselves. Another possible rationale for the behavior is that this may have been a communication or learning strategy, which stemmed from their personal cultural, language or gender background.

It is inferred that the new technology may have posed an additional communication barrier atop of other barriers that already existed for the underrepresented student due to cultural, language or gender differences. For example, during the initial phase, week three, Jiba \_J3 [1665-1975] completely missed the objective of the assignment, however, he appeared willing and interested in moving forward, which was demonstrated by his presence and inquiries regarding next steps. During the end of the team project, week six, Jiba\_J6 [413-651], completely missed the objective of yet another assignment. In another example, Marcel shared that the Second Life technology felt unnatural to him and that he had difficulties fully communicating through it (Marcel\_FG2). The third example occurred in the very beginning when Sarah reported feeling uneasy about the first SL session, which resulted in her working alongside the instructor and logging onto SL together with her in a real-world classroom. Incidentally, later on, she reported spending on average 40 hours per week in-world. Overall, however, it was disconcerting that throughout the course, despite demonstrated efforts, the

students that were underrepresented repeatedly missed understanding aspects of requirements in comparison to the majority of the students.

**Low motivation student.**

It was observed that a group of students was more likely to be absent and when in class, they were more likely to be minimally engaged and not on task. Students who fit this learner type were on one end of the extreme. They may have been enrolled in the course merely for credits. The findings for this learner type are primarily based on observations of repetitive behavior witnessed in various situations over an extended period of time since they hardly turned in their work. It is estimated that approximately 15-20% of the students fell within the low motivation learner type. Towards the end of the course, this percentage decreased slightly, especially for certain types of learning activities such as role-playing.

One way that their low motivation was observed is that these students did not participate much in class chat or through other methods of communication. When they were addressed, they did not necessarily respond. Avatar behavior was also indicative of whether they were engaged. When students were communicating through chat, their avatar could be seen typing. In group conversations, avatars tended to move and cluster together. When creating an object, avatars could be seen waving his/her arms and respective changes were witnessed in the object which was being manipulated. The low motivation student avatars did not demonstrate these indicators of engagement through communication nor through movement. Instead, for the most part they remained motionless and standing apart from main class activities. Once in a while they would even exhibit a pose where the avatar would slouch over forward, a state set off by no mouse movement or keyboard entry for an extended period of time.



It was difficult to obtain quotes from this subgroup because they were fairly inactive at journaling and did not respond to interview opportunities. The fact that most had not completed their assignments or else completed them at a much later date than they were originally due was evidence itself for their lack of engagement. The existence of this subgroup was further corroborated by members from all four teams. Team members privately shared in their journal entries or via interviews, often with annoyance and lack of forgiveness that their team was made up of one or two of these students. For example, Nathan\_J2 [2037-2168] attested to the frustration experienced by his team members as they tried to work with these students on the team project. To paraphrase, he perceived them as riding on the backs of others and hardly engaging in class activities to the detriment of the team's experience as well as the outcome of the final team project. In relation, a unique dynamic was observed between active students and passive ones. The phenomenon was witnessed during three out of four team focus group sessions. Namely, active students exhibited very little tolerance toward students with low motivation and/or productivity.

It was looked into further whether identified students' unresponsive behavior was due to the use of the new 3-D virtual world environment. Through additional inquiry, multiple sources corroborated that they found this particular group's behavior to be the same regardless of whether the class was facilitated through the new medium or was held on-ground. In other words, the majority felt that the low motivation students acted the same in Second Life as they had during the first portion of the course that was not held in Second Life. Students perceived the lack of participation to be more a function of their general attitude toward learning rather than anything else.

### **Factors which May be Related to Engagement within an Authentic Learning Environment through a Virtual World**

The fact that this was the first-time a 3-D virtual environment was being used by the students and by the instructor for the purpose of formal learning probably intensified an uneasiness for some, even though the majority were adept at gaming, which helped with communicating and maneuvering in this type of 3-D space. At one time or another, approximately 50% of the students exhibited uneasiness both with the open ended environment of Second Life and the real-world team project. The low motivation students were not counted in this percentage as their lack of engagement was consistent irrespective of delivery method. It was inferred that at least half of the undergraduates were unprepared for new teaching and learning methodologies, especially the lack of imposed structure. They were also unprepared for expectations of personal initiative and for a need to think outside the box. It may have been that they were used to a traditionally taught lecture-style classroom environment. The White team focus group expressed how they visualized college education as students sitting in the class, the instructor lecturing, and then afterwards taking a test. Another indicator of carryover from the traditional classroom included students continually sitting in prearranged seating, even when they did not need to.

There were class challenges in collaboration, participation and maturity for approximately 50%, about 15-20% exhibited what could be termed least-common denominator efforts, while approximately 30-35% early adopter students pushed the envelope. Possible student challenges with virtual world learning are illustrated with examples in Table 4.2.4. It is conjectured that these factors could link back to inadequate uses or facilitation of active,

reflective, and collaborative learning strategies. It was also inferred that for more than 50% of the students, creative faculties were perhaps stifled from before or else not adequately engaged within the course. The same was true with their comfort with ambiguity. Lack of engaged creativity and discomfort with ambiguity might be linked to individual student backgrounds, but also conjectured to correlate with the teaching methods and learning environment design.

Table 4.2.5

*Domain Analysis – Types of Challenges Encountered with Virtual World Learning*

Challenge	Characteristics	Examples
I.Comfort with ambiguity	Discomfort with ambiguity; desire for more structure	<i>[R: student was speaking for the rest of the class]"I think in general really really open ended assignments aren't something people look forward to...even though they should be you can do WHATEVER you want...but I think all in all attitude might have been better if people knew exactly what we are supposed to do and it was more specific" - Derrick Cpg1[8:18-8:20]</i>
II.Creativity	Discomfort or unfamiliarity with open ended tasks; curriculum thus far perhaps not focused enough on liberal arts, creativity, or promoting self-agency	<i>"They want to feel like they have lets say 10 tasks, and that those tasks should say exactly what they have to complete, and how to do it. [R: why?] Maybe they aren't in touch with their creative side...they could be math/science people, where there is ALWAYS a right answer, there has to be." - Zach Fpg10[9:04-9:06]</i>
III.Collaboration	Amount of participation in virtual world parallels that of real-world participation	<i>[R: the same 5 people...] "the same people that always chat you mean? I dunno because it was the same problem we had in rl" - Nathan B1pg6[11:40-11:41]</i>
IV.Participation	Possible lack of motivation, and fear of self-disclosure and/or authority	<i>[R: students weren't explorative?] "I think so...maybe to just get through class, maybe they didn't enjoy it, or maybe they are generally shy" - Zach Fpg9[8:50-8:53] "many people were afraid to say things in front of class" - Zach Fpg9[8:51]</i>
V.Maturity	Some lack of maturity, however progressive improvement observed throughout course	<i>"[R: interviewee responding to a question about peer-pressure] I know a bunch of people that either hung out together after, or lived together..I think it is definitely there...there are a lot of immature people, even in college, although a lot less than high school." - Zach Fpg9[8:53-8:57]</i>
VI.Bias	Skeptical about learning in a virtual world and constructing games in a virtual world	<i>[R: what do you attribute some students' lack of seriousness in the virtual world to?] "it might even be the nature of the class" - Nathan B1pg9[11:41]</i>

Out of the five gamer/team leader characteristics listed in the Table 4.2.3, comfort with ambiguity, creativity, and collaboration are in Table 4.2.6 for comparison purposes with other learner types. These three characteristics could be more objectively observed and reported on for the 18 participants as compared to the characteristics of self-agency and future planning. It is speculated that self-agency and future planning may have more to do with individual student backgrounds and proclivities than instructional design and context.

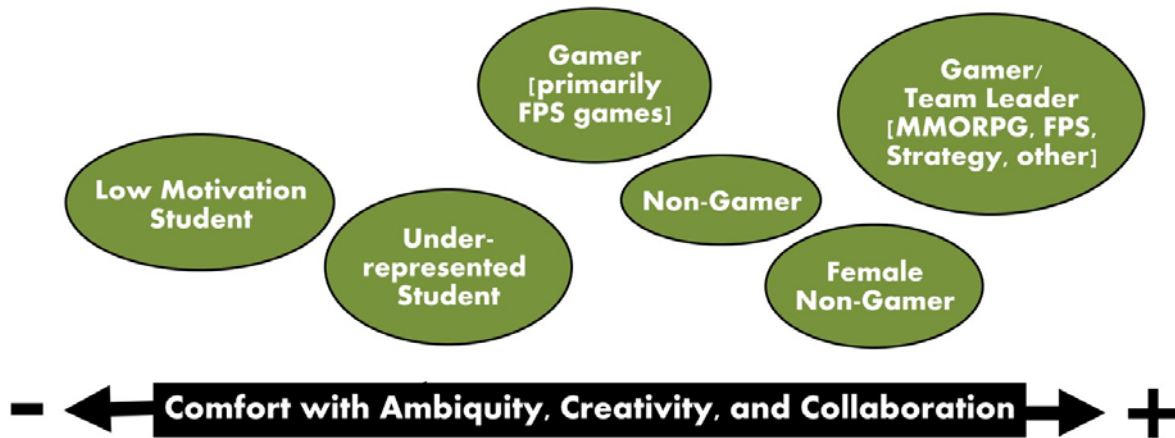
Table 4.2.6 highlights how the different learner types fared in exhibiting what were conjectured to be three factors which may be related to authentic learning environment engagement through a virtual world. The gamer/team leaders exhibited the most comfort with ambiguity, creativity, and collaboration closely followed by the non-gamer female and subsequently by the non-gamer. The non-gamers might have exhibited being more open to the new media due to not having a gamer bias. The gamers who followed were the ones who played a variety of games including MMORPGs, strategy and FPS games, and then the gamers who predominantly played FPS games. Underrepresented students came afterwards, and finally the students who exhibited low motivation.

For this case study, the gamer/team leader, the female non-gamer, and the non-gamer were more likely to be engaged in virtual world learning as compared to the gamer, the underrepresented student, and the low motivation student. Figure 4.21 presents how the different learner types fared on a continuum from left to right, which incorporates ‘comfort with ambiguity’, creativity, and collaboration. Due to the fact that the gamer/team leaders excelled in the class the most, it was conjectured that these factors may be related to authentic learning environment engagement through a virtual world.

Table 4.2.6

*Componential Analysis - Millennial Learner Types with Respect to Observed Comfort with Ambiguity, Creativity, and Collaboration*

Learner Type	Comfort with Ambiguity	Creativity	Collaboration	Average <sup>1</sup>
Gamer/Team Leader	3	3	3	3
Female Non-Gamer	2.5	3	2.5	2.6
Non-Gamer	2.5	2.5	2	2.3
Gamer	2	2	2	2
Underrepresented Student	1	2	2	1.6
Low Motivation Student	1	1	1	1



*Figure 4.211* Observed Comfort with Ambiguity, Creativity, and Collaboration of Millennial Learner Types in a Game Development Course Facilitated through a Virtual World

### **Research Question III Virtual World**

#### **Virtual World Effects on Communication, Environment Development, and Collaboration during the Lifecycle of a Real-World Team Project**

The third research question was: How did the virtual world affect Millennial communication, environment development, and collaboration during the lifecycle of a real-world team project? The unit of analysis for this question was one of the three phases of the team project. There were four teams, each with approximately 4-5 participants per team. Research question three was assessed through participant observation and review of team focus group sessions throughout the three phases of the team project. A sample focus group transcript may be reviewed in Appendix E. Triangulation was achieved through other methods such as journal documents and interviews, and through various sources.

Three major themes emerged from the data as pivotal in the evolution of the classroom learning environment. These included the evolution of team communication, the 3-D classroom environment and the team collaboration over three phases of the team project.

#### **Chronological Trend Analysis: Virtual World Team ‘Communication’**

##### **Phase I: Understanding one-way virtual world ‘communication’ - Chat language.**

Theme analysis was used to elicit ‘ways of being’ through analyzing short chat abbreviations and expressions. The purpose of the analysis was to better understand student use of chat language. Frequently used short chat abbreviations and expressions were gathered throughout the study as typical examples. From right to left, Table 4.3.11 provides chat examples, interpretations of what the chat examples mean, and their categorization into respective ways of being. It is conjectured that in lieu of facial expressions and other methods of

communication, students could express in relatively few letters how they were feeling, what they were thinking, what they will or will not do, and how their behavior was changing.

Table 4.3.11

*Theme Analysis - Ways of Being in a Virtual World through Chat ‘Communication’*

<u>Way of Being</u>	<u>Interpreted Meaning</u>	<u>Chat Expression</u>
<u>Feeling</u>	I'm laughing.	<i>haha</i> <i>hehe</i> <i>:)</i> <i>lol</i>
	I'm frustrated.	<i>err</i> <i>arghh</i>
	Are you kidding me?	<i>nah</i> <i>o</i>
	I'm thinking.	<i>ummmm</i> <i>um</i>
<u>Thinking</u>	I understand.	<i>ahh</i>
	I'm confused.	<i>Ehh</i> <i>huh?</i> <i>dunno</i>
	Yes, I agree. or Yes, I will.	<i>mhm</i> <i>mm-hmm</i> <i>deff</i> <i>k</i> <i>okie</i> <i>ya</i>
<u>Doing</u>	No, I don't agree.	<i>heh nah</i> <i>aaaah, no</i>
	I meant to say:	<i>pays</i> <i>plays*</i>
<u>Changing</u>	Nevermind.	<i>nvm</i>
	I'll be right back.	<i>brb</i>

## **Phase II: Understanding two-way virtual world ‘communication’ - Instant Messaging dialogue.**

Vignette analysis was used to illustrate an archetypal two-way Instant Messaging conversation during a class session in Phase II of the team project. The purpose of the analysis



was to provide a snapshot of the themes which ensued from conversations during class sessions. The vignette was constructed from frequently used student expressions, content from class chats and Instant Messaging, participant observation, as well as from the Purple team's focus group session. The themes are listed in the leftmost column of Table 4.3.12 and each cluster corresponds to a section of the Instant Messaging dialogue on the right of the Table.

It was observed that different communication channels such as voice, chat, IM, and use of 3-D affordances created an environment rich with multi-modal communication possibilities, however also complex to coordinate in terms of communication. The need for more frequent communication and the need for diversification of communication media tools were attributed to effects of virtual world media. Though virtual world media lacked real-world communication cues, it had the affordance of persistent interaction through multi-modal communication, which added to its transparency.

Table 4.3.12

*Vignette Analysis - Archetypal Instant Messaging 'Communication' during a Virtual World Class Session*

Themes	Dialogue <sup>a</sup>	
- Team disadvantaged due to lower numbers - Low motivation student	<i>Derrick: wheres Oren?</i>	<i>Wes: he said he's gonna log in later - maybe like sleepin Wes: lol..so nothin changes huh?</i>
- Many places student attention could reside e.g. online game - Hiding behind shroud of internet - Same behavior as in face-to-face class	<i>Derrick: yeah, even if we get to log on to class from dorm n no one sees us play Call of Duty during lecture...hehe</i>	<i>Wes: lol Oren acted the same before this Second Life thing</i>
- Team leaders using various communication mechanisms - Confusion about assignment directions - Students would like to collaborate more	<i>Derrick: wait...he just texted me...he says he read the assignment and that &lt;I&gt; did it all wrong</i>	<i>Wes: what? u did it? thought it was like a team thing - as in "we" get to work on it in SL</i>
- Gamer/Team Leader taking responsibility to incorporate others' ideas and other team members - Student perception of instructor's expectations possibly influencing engagement	<i>Derrick: nah...we're all set - I used your quest idea n for Oren and Vince, I made up stuff cuz they're like never *really* here...</i>	<i>Wes: dunno...guess they know they'll just pass the class anyway.</i>
- Problems with: hardware, use of audio, being logged off		<i>Wes: OK so...whats due? choppy audio-----</i>
- Intermittent technical/communication difficulties – need to repeat aspects of dialogue	<i>Derrick: dude – ya there?</i>	<i>Wes: brb</i>
- Use of short chat language exchanges - Ability for behind the scenes dialogue with IM for clarification purposes		<i>Wes: had to logback in Wes: *log back Wes: Seriously?? Am I the only one confused here...I</i>
- FPS gamers not naturally exploring unless archetypal path laid out for them	<i>Derrick: k...I think the RPG II thing, that's what was posted on Bb</i>	<i>Wes: ahhh...didn't know anything was posted on Blackboard</i>
- Students frustrated with inconsistency, especially when	<i>Derrick: grrr sometimes hhe tells us during</i>	<i>Wes:...that sucks man. Oh no she wants us to type in</i>

<p>trying to do well</p> <ul style="list-style-type: none"> <li>- Nature of Chat dialogue - casual, colloquial</li> <li>- Ability for everyone to contribute at the same time</li> <li>- Different levels of technical abilities</li> </ul>	<p><i>Derrick: during class sometimes after so like how in the frickin' pajamas</i></p> <p><i>Derrick: can u tell?</i></p>	<p><i>example – I'm like totally slow typer</i></p>
<ul style="list-style-type: none"> <li>- Discrepancy between instructor's typing speed and student expectations and quick style of thinking and responding</li> <li>- Incoming K-12 students used to traditional lecture followed up with test</li> </ul>	<p><i>Derrick: whatever..bet ya could beat the instructor</i></p>	<p><i>Wes: yeh would be hard not to lol</i></p> <p><i>Wes: but really, howya supposed to do well in this class?shouldn't there be a test or something</i></p>
<ul style="list-style-type: none"> <li>- Course activity infiltrating or mixing with activities relevant to the students</li> <li>- Gamer competition</li> </ul>	<p><i>Derrick: don't know what to tell ya - stick with me QuizMaster or what ever your NPC is.. Ha!</i></p>	<p><i>Wes: Seriously? Like you think you're better at Call of Duty AND all this.</i></p>
<ul style="list-style-type: none"> <li>- Desire to use SL optimally for what one cannot do in class</li> <li>- 'On-the-fence' attitude, seeing the class not necessarily as an opportunity for change</li> </ul>	<p><i>Derrick: Just sayin – wouldn't be bad if we did more stuff versus listen to lecture, ya know like got to explore Second Life and build cuz why not, we're already in 3-D and all.</i></p>	<p><i>Wes: Suuuuuuuuuuure.</i></p>
<ul style="list-style-type: none"> <li>- Difficulties in concentration and/interest in listening to lecture</li> </ul>	<p><i>Derrick: Ya know? Its just sometimes so hard to listen to lecture.</i></p>	<p><i>Wes: Yeah</i></p>
<ul style="list-style-type: none"> <li>- Learning engagement during role-play of the practice run</li> <li>- Ability to take on a different gender, ethnicity, etc.</li> </ul>	<p><i>Derrick: Okie dokie – but, like the practice run was kinda cool, especially when that girl played our game.</i></p>	<p><i>Wes: Howdya know she was a girl???</i></p>
<ul style="list-style-type: none"> <li>- Even though we may change how we look, our language expresses who we are</li> <li>- Female games may tend to focus on nurturing, gathering, creating, cause-effect</li> </ul>	<p><i>Derrick: uhmmm...she's played Sims and Pokeman.</i></p>	<p><i>Wes: right...lol</i></p>

*Note 1.* <sup>3</sup>Derrick and Wes, members of the Purple Team, are Instant Messaging (IM) behind the scene of a virtual world class session. Oren, not a very active team member, has texted them once during their Instant Messaging conversation.

**Phase III: Understanding virtual world team ‘communication’ - Virtual world culture.**

*Learning affordances: Virtual world social media versus an individual technology.*

The game development course used GameMaker software during the face-to-face portion of the course in order to experience aspects of game engine functionality. In comparison to SL, GameMaker resembled a game engine for game development. Approximately 25% of the students were already familiar with GameMaker prior to using it, some having used it through the university’s game development club. This was in contrast to the fact that 0% of the students had previously used Second Life for learning purposes.

Earlier field reconnaissance from fall of 2008 coincided with the current study’s student reflections on the different learning affordances of the two technologies. Real-time collaborative learning was not facilitated through projects assigned with GameMaker software as compared to when they were assigned through the use of Second Life. The idiosyncratic nature of the GameMaker software limited student opportunities for social interaction. Students remarked that the need to aim for 100% participation and collaboration in SL were unique in comparison to what was required with other technologies on comparable projects.

GameMaker projects tended towards single task responsibilities and team roles which remained unaltered throughout the lifecycle of the project (e.g. one team member responsible for visuals, another team member for programming, etc.). Both earlier field reconnaissance and the current study’s students revealed that the actual collaboration using GameMaker often resulted in the swapping of files the night before the project was due where one team member gathered everyone’s work and did most of the synthesizing for the project. Furthermore, this team

member would usually contribute much more in comparison to others' work, as well as have the opportunity to practice much more real-world problem solving, trouble-shooting, and improvising to finalize the project.

***User bias: individual gamer backgrounds and team compositions with outliers.***

One team in specific appeared to exhibit a slightly negative attitude about course learning expectations, as well as Second Life. During their focus group meeting, they pushed back with resistance toward both the course and Second Life, and they did not appear to be trying to work together. This was particularly the case during the first two phases of the three-phase team project. It may have been that during this time, this team still did not realize that for their project to succeed, they would all need to get on board and to be in sync with each other.

One characteristic that set this team apart from the other teams was the range of its members' gaming aptitudes and career aspirations. For example, Bill was a seasoned gamer, a frequenter of the university's game club, and had aspirations of being a game developer. On the other end of the spectrum, Marcel, an English-as-a-Second Language (ESL) student, did not play games, was enrolled in the course merely for credits, and was majoring in network security. While the gamers of this team demonstrated a bias towards Second Life as a platform, the ESL student and the one non-gamer on the team were unfamiliar with the virtual world and voiced skepticism. Bill, a gamer/team leader, provided a gamer perspective on Second Life - a bias that some current gamers were aware of from an earlier course and a challenge in visualizing gaming development facilitated through a virtual world:

*"I've heard a lot of hate come from Second Life just in general. Like, you hear people talk about, "Oh, Second Life, all those losers on there blah blah blah."...and then when the instructor suggests like, "Oh, we're gonna do Second Life," and then on top of that, I notice all*

*the kids previous Intro to Games students are like, “Oh my God, the Second Life part was so stupid” ...so then you’re already going in with a bias against it...And then on top of that, how do you—what does doing something in Second Life have to do with making your own independent game? I guess it works —“ Bill\_FG2 [487-495]*

Whereas it had been conjectured that Millennials would be welcoming of social media, especially as they spent a lot of time inhabiting this technological landscape, it was not the case in this study for the subgroup of Millennials who were gamers. They were not too positive about learning through Second Life, especially the gamers who predominately played first-person-shooter games (FPS). However, it was observed that those who played a variety of game genres, including MMORPGs and strategy games, were more likely to have a positive learning experience. It was inferred that a portion of the negative attitude stemmed from a type of gamer elitism where it is common to compare the capabilities of one platform to another. The gamers had entered the course with an already established idea of Second Life as a game played by non-authentic gamers. Hence, there was a perceived difficulty for the majority of the gamers to see SL in a different light - i.e. not as a subpar game and instead - as a viable virtual world environment for learning.

***Gaming team player versus virtual world team learner.***

Students indirectly spoke about having scores of choices and being motivated when playing a game, yet when referring to learning through a virtual world entirely different rules seemed to apply. While they expressed comfort with their own and their peers’ errors or failure during gameplay; it was observed that in contrast, they were particularly uncompromising toward members who were not on board with the team projects. It was speculated that their lack of acceptance with team members who were not contributing equally was related to not being

comfortable with ambiguity. Only one gamer throughout the entire case study explicitly expressed the linkage between learning and playing games. He made the connection between teamwork being essential for a virtual world team project as well as being required to achieve gaming goals:

*“I learned that teamwork is essential to the development of a game. Teamwork is also required during multiplayer games to accomplish goals.” – Bill \_J1 [1063-1203]*

Five out of eighteen or approximately 30% of the students were observed as embracing the open-endedness of the course, and approached it with an attitude of experimentation. About 20% of the students were hardly engaged regardless of the activity and/or medium. This left approximately 50% of the students on the fence, the majority of whom adopted the environment by Phase III of the team project. Due to the many different variables at play, it is difficult to speculate why exactly it may have been challenging to employ the element of experimentation within the course.

### **Chronological Trend Analysis: Virtual World Team ‘Environment Development’**

This section chronologically analyzes the evolution of the student-created 3-D classroom environment from the initial class sessions up to the last class sessions. The next three subsections illustrate chronological themes, which arose during Phases I, II, and III respectively. Phase I refers to first two and a half weeks of the team project, Phase II refers to the following second two weeks of the team project, and Phase III refers to the last two and a half weeks of the team project.

### **Phase I: Co-creation of 3-D classroom environment.**

Initially, the first time users of the virtual world experienced technical difficulties with the hardware. Some were observed arriving to class late, having had issues either with logging on or with being kicked off. While the instructor was becoming familiarized with operating the in-world PowerPoint presentation screen, a few of the students were having difficulties even ‘teleporting’ (finding the location of the classroom area). Figure 4.3.21 displays an initial class session that got off to a slow start. It can be observed that not all 18 students are there. In fact, the instructor had not joined the class yet, and the student observed standing was just trailing in. Meanwhile, in the background of the seemingly idyllic classroom scenario, there were frantic instant messages requesting assistance amid three students, a few of their peers, and I.



**Figure 4.3.21** Initial Assimilation to Virtual World (Phase I)

Another repeated phenomenon during the first couple of class sessions was that the students kept bumping into the chairs, which were interactive objects that became activated and chatted when the avatar came in contact with them. For some, the object interaction might have



been surprising, but the frequency of occurrences also seemed to indicate a need for interaction regardless of purpose. There were also a few instances when a microphone other than the instructor's was left on, and as a result, an electronic reverb of class chat typing was heard.

Prior to the initial class session, the students were provided with documentation and guidelines for communicating and navigating within Second Life. They were also assigned Second Life practice activities; however, the assignment was not followed up with an expectation for each to demonstrate their mastery of basic skills. As a result, it was not known how many of the students had actually reviewed the documents and successfully completed the practice activities, nor how many felt comfortable with basic skills at the onset.



**Figure 4.3.22** Transition from face-to face Classroom Lecture to Mini Lecture in Virtual World (Phase II)



**Figure 4.3.23** Collaborative Spaces Toward Learning Engagement in a Virtual World (Phase II)

In transition from Phase I to Phase II, attendance at the onset of class sessions enhanced, however it was still not 100%. In Figure 4.3.22, four students were absent or on their way to

class. These four might have been the students described earlier who exhibited low motivation. The majority of the students appeared passive when the class activity involved a mini lecture by the instructor. As depicted in Figure 4.3.22, there was nominal class chat interaction, indicated by no hand movement (if chatting, student hands would have been captured in motion within the snapshot), and by no indication of voice communication (if using audio, a student would have had a tiny green icon radiating from atop their avatar). Moreover, a couple of the student avatars appeared entirely inactive (a state assumed by avatars when there had been no computer input for a length of time), for example the slouched student in the very back of the semi-circle. It may have been that he was logging off, not paying attention, or doing something other than being present in class, such as updating a Facebook status on his iPhone or eating a pizza pocket.

Figure 4.3.23 on the right features the 2<sup>nd</sup> portion of the class session. In the figure, the White team was clustered around their team activity area, which was signified by the colored geometric 3-D object, (other teams' areas were signified by objects dispersed in Figure 4.3.22 on the left). Though the designated areas for team work were simple geometric shapes, nonetheless, they were adequate for providing a specific gathering place for each of the teams. In this example, the low-tech solution of a simple 3-D object (prim) could function as effectively as a high-tech futuristic-looking pod designed specifically for collaboration.

Student engagement increased during team activities in comparison to mini lectures. Figure 4.3.23 on the right showcases three out of five students chatting about creating their game. The team was also observed remaining after class to plan next steps. Students began to collect objects (e.g., the car in the far left of Figure 4.3.22), to experiment with building game

assets (e.g., the ball in Figure 4.3.23), to modify the look of their avatars (observed in three out of five team members for each team), and to reflect their avatar's activities with movement.

**Phase II: Co-creation of 3-D classroom environment.**



*Figure 4.3.24* Visual Media Expression through Avatars and 3-D Modeling (Phase II)

In Figure 4.3.24, students further collected and developed 3-D objects for their game project, samples of which may be seen scattered around the classroom. They further developed their avatars to reflect the non-player characters (NPCs). For example, on the left side of the snapshot, a blue short character and a lanky purple one are observed. This coincided with the Purple team experimenting with their game storyline, which involved saving a princess from monster-type characters.

In the middle area of the class, behind the square prim, there were four White team characters resembling a heavy metal band. They had chosen to create and role-play an amusement park game. Their characters represented all kinds of punks and curious characters they thought one might encounter within an amusement park.

During Phase II of the project, as exemplified within the snapshot in Figure 4.3.24, there was a looming sense and reports of disengagement with the class sessions and Second Life itself with students expressing that they were bored when class was a lecture. It is also during this phase of the project that the instructor reverted back to a customary style of in-class teaching, which was mostly composed of lecturing. In parallel, the students would sit in the same seating arrangements and not experiment much with new types of co-creation or other interaction.

Students who spoke up during the behind-the-scenes interviews suggested that the uniqueness of the virtual world should be exploited. Things that were suggested included field trips to islands with games and interesting fantasy worlds, more practice with role-play, debate or interview activities, and more time to build and script the gear and world for their game. It was inferred that the students wanted to ‘learn by doing’ and to be guided through the process rather than be talked at. Radically different than just wanting to ‘do whatever’, students desired to try things out, and to be coached with prompts and meaningful feedback.

**Phase III. Co-creation of 3-D classroom environment.**



**Figure 4.3.25** Taking Advantage of Ill-Structured Project to Break Down Environment Barriers (Phase III)

Three weeks prior to the end of the course, approximately a third of the students became more engaged as compared to the middle couple of weeks. These were the gamers who were team leaders, the female non-gamer, and a few non-gamers and a few gamers. Participant observation attributed it to student realizations how the lack of restrictions in open-ended projects related to creativity opportunities in their game projects. This is also partially attributed to grade motivation for the final project.

The students were observed as taking on more ownership in communicating their classroom environment needs within the virtual world. In addition to creating game assets and gear, and modifying their avatars to reflect their team games, students also tweaked the look and feel of their classroom environment. This progression may be observed by reviewing the evolution of the student-created learning environment between Figures 4.3.21 and Figure 4.3.25

and their respective descriptions. In Figure 4.3.25, Derrick created couches to sit on, expanding on the idea that if it is to be their classroom, why not make it more comfortable? Furthermore, students were observed walking around while the instructor was talking, perhaps taking initiative to break up the rigid format of the lecture component of the class. Even the Chat discussion became progressively livelier and richer in content.

It is conjectured that as the content became more relevant to the students, boundaries were pushed in terms of creativity and authority. Thus, the overall authenticity of the classroom environment increased. The student-created learning environment started to reflect an actual game development house, and the innovative open communication started to resemble the kind of dialogue which might eventually lead to the development of a popular new game.

#### **Chronological Trend Analysis: Virtual World Team ‘Collaboration’**

Table 4.3.31 chronicles virtual world team ‘collaboration’ over the three team project phases. Chronological themes are identified for each phase in the leftmost column of the table. In the middle of the table, sample quotes are listed which led to theme development. The checkmarks in the rightmost column signify the themes were observed three or more times during team activities.

Table 4.3.31

*Chronological Trend Analysis - Virtual World 'Collaboration' over the Lifecycle of a Real-World Team Project*

Phase I <sup>a</sup> Trends	Examples	Obs <sup>b</sup>
I.1 Initially positive about how teamwork will evolve in the virtual world	<i>This week I just learned by working with my team. The only thing that helped this week was just working with my team and discussing the assignment</i> W_Jack_J1 [1397-1545]  <i>I learned this week by interacting with my team.</i> B_Jiba_J1 [1436-1484]  <i>I think that our inworld teamwork is really paying off. We have an idea of what we would like to accomplish in our game, a target audience, and the building blocks to a pretty good story line.</i> B_Luke_J1 [2553-2747]	
I.2 Becoming more accustomed to virtual world teamwork, however transition is gradual	<i>I think the inworld team work is starting to get better because everyone is starting to get more accustomed to it</i> W_Storm_J2 [1692-1808]  <i>I realized that our team has pulled together to come up with great ideas for our game which has helped progress the main concept greatly.</i> B_Luke_J3 [1983-2265]	✓
Phase II Trends	Examples	
II.1 Reverting back to face-to-face strategies to try to improve teamwork: e.g. Requesting to meet face-to-face, Over-relying on the team leader	<i>Our teamwork is getting better. Will probably benefit even more if we meet outside of Second Life.</i> W_Bill_J2 [1273-1372]  <i>...was absent one day and since he had our documents on his computer (since he has generally been the one who submits our team assignments) it was difficult to remember all the details of what we had previously done.</i> W_Storm_J3 [2046-2261]	✓
II.2 Account of finding teamwork challenging in virtual world; member on team attributes virtual world communication challenges as rationale why behind on project	<i>Teamwork is harder in a virtual world.</i> W_Bill_J4 [1803-1842]  <i>I did learn that communicating in the virtual world is not nearly as effective as meeting in real life and because of that my group had gotten behind in our work.</i> W_Jack_J3 [1813-1976]	
Phase III Trends	Examples	
III.1 Participation and contribution from all required for co-creation and role-play in virtual world; Importance of working together continuously for project to go well	<i>In order for this project to go well, everyone had to have an active role in participation and in the contribution of ideas.</i> B_Luke_J7 [3119-3244]  <i>For this project to go well everyone had to participate a good amount and put some time and effort into it. This project was different than others I had done because we were acting out characters in a game and we all had to constantly work together to make sure the final project came out as planned. The idea that everyone had to work together worked very well because our game came together very nicely and made sense because we were constantly collaborating. It was not hard to get everyone on board with our project. We all liked the idea and all wanted to contribute.</i> W_Jack_J7 [2859-3436]	✓
III.2 Everyone staying in character and on task during role-play positively affected the authenticity of the game for the player testing it	<i>I think that if not everybody participated in this game, it would not have gone well at all. We all had specific roles to do, and without these roles, the player would have had no idea what to do.</i> W_Chip_J7 [2314-2513]	✓

*Note 1.* <sup>a</sup>Phase I refers to the first two and a half weeks of the team project, Phase II refers to the following second two weeks of the team project, and Phase III refers to the last two and a half weeks of the team project. *Note 2.* <sup>b</sup>Obs: The rightmost column refers to phenomena observed three or more times in relation to team collaboration.

**Phase I (Design): Virtual world ‘collaboration.’**

The first phase of using the 3-D virtual world for team collaboration was received with excitement as a new and novel concept. This attitude was evidenced by positive quotes about virtual world teamwork by the majority, for example, underrepresented students such as Moe, seasoned gamers such as Jack, and gamers who were team leaders such as Luke in Table 4.3.31, Phase I, Part 1. Given that the majority of this course’s Millennials were playing or had played games which had 3-D virtual world environments, it had been inferred that becoming accustomed to maneuvering within Second Life was not going to be much of an issue.

Over time, it was observed that working together on the team project to accomplish learning tasks did pose somewhat of an issue. However, initial student excitement had not yet waned, and team members tried different approaches to enhance their collaboration as illustrated in quotes of Table 4.3.31, Phase I, Part 2. Storm alluded to teamwork challenges when he said that his team had ‘started to get better’ as did Luke when he expressed that his team ‘has pulled together to come up with...’ The collaboration challenges were partially attributed to figuring out how best to accomplish learning tasks together within teams of both differing motivation levels and virtual world collaboration skills.

It was quickly observed that approximately 15-20% of the students along with the Baby Boomer generation instructor experienced some difficulties with using the advanced functionality of the virtual world. Even though this represented only a small percentage of students unaccustomed to the virtual world, and despite the fact that this was a computer science instructor accustomed to adapting to new technologies, it was interpreted that this slightly hindered teaching and learning in a virtual world. With regards to class sessions, this



necessitated adjustments to activity sequencing and reduced time for teamwork, as well as decreased the overall quality of virtual world communication. For example, if one to two team members out of the four to five within a team were not fluid with communicating in the virtual world, team processes were impeded.

Student attitudes highlighted through quotes and observations in Table 4.3.31 (Phase I), coincided with data from the Phase I focus group session conducted with the Purple team. Figure 4.3.31 shows the initial positive attitude toward teamwork in the virtual world during Phase I, Part 1. Shortly thereafter, it reflects a number of virtual world communication and learning engagement challenges throughout Phase I, Part 2 of the team project. Overall, virtual world ‘collaboration’ was moderately observed during Phase I which included the first two and a half weeks of the team project.

**Phase II (Development): Virtual world ‘collaboration.’**

At the phase II juncture, the instructor reverted back to a traditional lecture style with one-way information flow, as opposed to the earlier more choreographed and activity-based class session ‘flow’. As if responding out of habit, the students exhibited more passive behavior in comparison to Phase I. This is indicated by the example quotes and observation in Table 4.3.31, Phase II, Part 1. Bill requested for increasing time for team collaboration, such as a required team meeting. Storm implied that his team had started to rely more heavily on their team leader to do the required work and to keep them on track. In conjunction, interviews revealed that similar freeloading behaviors had also been present during face-to-face team projects prior to the Second Life experience.

As suggested by the quotes and observations in Table 4.3.31, Phase II, Part 2, some team members expressed a slight resistance towards the virtual world of Second Life. Members of the White team, Bill and Jack, shared a sentiment that virtual world teamwork is more challenging than real-world teamwork. Jack even expressed holding the virtual world responsible for his team's lack of engagement.

It is important to note, however, that the resistance was not universal to all students. In fact, the need for assimilation and a different type of achievement with the newly appropriated use of the virtual world was interpreted to be a positive challenge for the gamers who were team leaders. They acted on opportunities to assist their team and the instructor with the use of the virtual world. For example, they were observed as doing things such as showing up early to test the voice chat with the instructor, IM-ing with students who ran into technical difficulties, and sharing resources such as how to script in Second Life or how to import 3D Studio Max objects into Second Life.

In Figure 4.3.31, during Phase II, observation of team initiative and collaboration within the virtual world dwindled and had almost settled onto a plateau. In fact, it was difficult to foresee a return to the kind of team collaboration that had been initially anticipated due to the optimism related during Phase I. These findings coincided with student statements from the Phase II focus group session conducted with the White team. Overall, virtual world 'collaboration' was minimally observed during Phase II of the team project that lasted for two weeks.

There were a number of reasons as to why this may have occurred. The switch from more open yet choreographed class sessions during Phase I to sessions consisting more of lecture

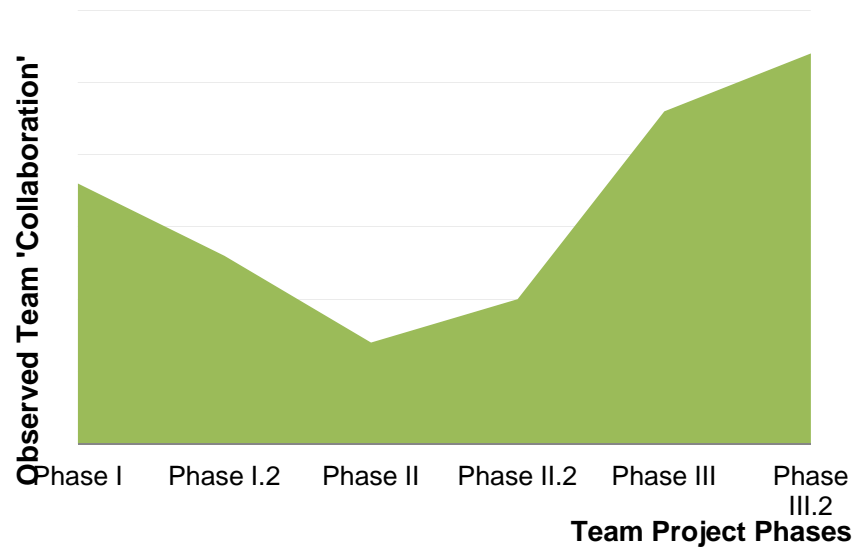
and not enough time for teamwork during Phase II decreased opportunities for interaction. It also decreased the initial excitement that a virtual world class might offer unique possibilities as compared to a regular class. It might also be attributed to the aforementioned technical skills a small percentage of the class experienced. The instructor's use of Second Life may have also affected student perceptions about the use of the new technology for learning. For example, when it took longer for the instructor to type or when the instructor ran into lecture audio difficulties, the students either expressed frustration or else their attention seemed to be diverted to something else. The latter was particularly true for the gamers, as speed and reaction time were important in the gaming environments they had grown up with. Also, some dissatisfaction might have occurred due to the intermittent technical issues a few experienced with the laptop graphics card and connectivity.

**Phase III (Testing through role-play, Reflection): Virtual world 'collaboration.'**

As team members attest in Table 4.3.31, Phase III, Part 1, co-creation and role-play activities in the final Phase III of the team project required all students to participate in unique ways, both individually and collectively. Luke mentioned that it was necessary to do so for the project to go well. Jack reflected that it was important to be continually engaged as a virtual world team. In other words, only after co-creation and role-play, was there a consensus indicating that sustained collaboration from all team members was critical during Phase I (design), Phase II (development), and Phase III (testing) project phases.

Additionally, Chip remarked (Table 4.3.31, III, Part 2 section), that the more team members interacted in character for the role-play, the more authentically they simulated the game for the player testing it. The findings illustrated in Table 4.3.31, Phase III coincided with data from the

Phase III focus group sessions conducted with the Red and Blue teams. As graphed in Figure 4.3.11, virtual world ‘collaboration’ was substantially observed during game co-creation, game role-play and reflection of Phase III that transpired during the last two and a half weeks of the team project.



**Figure 4.3.31** Virtual World ‘Collaboration’ over the Lifecycle of a Team Project

Figure 4.3.31 maps observation of virtual world ‘collaboration’ over the three team project phases. Virtual world ‘collaboration’ progressed from initial excitement during Phase I, decreased almost to a plateau during Phase II, and then once again became reactivated and progressively sustained throughout Phase III of the team project. This type of curve parallels the technology adoption curve of many new technologies. It is interesting, however, that it was replicated in the current study on a micro scale of 18 participants during a team project that spanned half a semester.

In summary, communication was found to be short, frequent and transmitted through various tools. There were inferred differences between affordances and cultures of a virtual world, an MMORPG, and uses of an application. As the communication became easier and more expressive, a more authentic 3-D environment developed. Likewise, team collaboration increased with co-created 3-D environments and role-play.

## **CHAPTER V “Discussion of Implications, Future Research, and Conclusion”**

The chapter discusses findings and their implications, and suggests future areas of study. Where appropriate it also relates the findings to other empirical studies. Instructional design and teaching strategy considerations are presented for research questions one, two and three respectively. Future research questions are recommended for each research question, and possible limitations of the study discussed. The chapter ends with the significance of the study.

### **Research Question I Authentic Learning Environment**

#### **Student Experience toward Learning in a Course Facilitated through a Virtual World and Designed as an Authentic Learning Environment**

##### **Support of Authentic Learning Strategies**

Student experience with respect to learning strategies helps illuminate what is needed in a virtual world. Though the creation of an authentic context and the design of authentic activities with real-world scenarios is a complex undertaking, it is not enough for an authentic learning environment. Educational authenticity also requires a practical approach toward how people currently learn. Accordingly, this calls for the integration of active, reflective, and collaborative learning strategies and opportunities for use of technologies into the design of learning activities (Driscoll, 2002). In pursuit of a learner-centered paradigm, it is advised that the foremost consideration for instructional design within virtual worlds be a determination as to what extent conditions are available which support authentic learning strategies.

The final section of chapter two’s literature review, which deals with real-world learning through SL, describes learning from simulations, and acquiring hard skills and soft skills. In the current study, all three of these may include active learning and/or reflective learning. Active

learning encompasses learner engagement, exploration, and self-agency in the construction of knowledge. Reflective learning refers to integration of new concepts into previously established knowledge structures, metacognition, and application of new concepts to personally-relevant situations and new examples. In the current study, collaborative learning is analogous to practicing soft skills and to certain types of simulations. Collaborative learning refers to learner engagement and development of new insights through his or her interaction with the social environment.

Support of learning strategies in instructional design could be extended into our instructional design (ID) language when substantiating or developing ID or learning models and theory. For example, if the convention has been to refer to strategies as teaching strategies, the new convention could place emphasis on the learner and refer to them as strategies for facilitating learning. Language used to describe learning strategies through a virtual world should center on the specific learner population, which in this case study refers to the Millennial learner in a game development course. For example, unless actively engaged in meaningful individual or collaborative practice, Millennial attention may become easily distracted, especially due to all the possibilities of the environment. This may be exacerbated in cases when virtual world class sessions are facilitated in an entirely lecture-based traditional format.

#### **Active and collaborative learning strategies.**

Good (2008) found that role-play engagement in a virtual world is comparable to that of role-play in a face-to-face environment. The study was similar to the current study in that it was conducted through Second Life and its framework was based on constructivism and problem-based learning. The students worked in teams for real-world clients to meet a need by creating

innovative solutions. At their level of expertise, they would not have had this opportunity in real life. The study provided a process account of the experience and pointed out the interrelatedness of pedagogy and media (Good, 2008). Through the problem-based learning, the following were facilitated: a deep exploration of problems, student ownership of work, problems which were flexible, and ease of assessment (Good, 2008). In the current study, deep exploration of real-world problems was observed when active, reflective and collaborative learning were facilitated. Student ownership appeared more likely to occur

- through meaningful interaction;
- for teams with strong collaboration skills; and
- for gamers who were also team leaders.

In another recent study (Jarmon et al., 2008), which utilized SL with an active learning approach, students engaged with their real-world projects so much that their involvement extended beyond class requirements. Though learning engagement had increased over time in the current study, it is inferred that half a semester was not enough time to develop a “community of practice” (Wenger, 2000) that would extend beyond class. In the authentic learning environment of Herrington and Oliver (2000), exploration and reflection had also extended beyond classroom experiences. For the current study, this occurred for approximately 20-25% of the students.

The expectation for collaborative learning was positively received and executed by the students in the current study. Similarly, Brown et al. (2008) found that group work could be practiced for real-world gaming education skills through the use of SL. Additionally, Leonard et al. (2011) used the environment of SL explicitly to teach collaboration skills.



**Reflective learning strategies.**

Since the majority of the students in the current study appeared to be challenged by the practice of reflective learning, it may have been due to a lack of exposure to it during their K-12 college preparation. Otherwise, it may have been due to their Millennial generation or individual backgrounds. Another study explored reflective learning in a virtual world for higher education. The virtual world of Appalachian Educational Technology Zone (AETZone), located on the Activeworlds Inc. server, was similar to Second Life, however, it is mainly geared toward educational purposes. Since it has a much smaller user base it approximates the real-world to a lesser extent than does Second Life. In the AETZone study's library course, the students were to plan, act, and reflect, goals similar to the current study's game development course which included designing, developing, and testing/reflecting. The AETZone study surveyed 35 volunteer participants out of the 50 graduate students in the class. Sanders and McKeown (2007) found that the graduate students had little expectation for reflective learning in their academic career and not much prior experience with it. Furthermore, student reflection which occurred during their study was not necessarily related to real-world learning.

For Sanders and McKeown (2007), reflective practice provided a snapshot of what students had accomplished, where they were, what they had left to do, as well as what they were struggling with in regards to their projects. Strategies for facilitating reflective learning included scaffolding, such as using conversation starters for social reflection and prompts for personal reflective journaling. The researchers suggested that reflective practice coupled with real-world learning might have greater chances of being taken seriously, as it is likely to be personally

relevant (Sanders & McKeown, 2007). These three research outcomes were also observed in the current study.

### **Design of Authentic Activities and Assessment**

#### **Authentic activities.**

The current study's student experience with authentic activities and assessment provided insight into best practices towards design of authentic activities and assessment through a virtual world. Real-world work scenarios no longer have the luxury of individuals working on projects solo because information and practices are distributed across social and technology networks. Class sessions which are predominantly lecture experiences may disserve Millennials because the expert behaviors being modeled are not adapted to real-world work scenarios. Suggestions for authentic activities in the virtual world include ones that progressively build towards a real-world team project, problem, or design challenge. A larger scale project may incorporate and vary the use of active, reflective, and collaborative strategies within the affordances of the virtual world for online or web-enhanced courses.

Aurilio (2009) studied how people learn in SL and found the environment particularly conducive to extended world-building. Both the Aurilio (2009) study and the current study utilized virtual ethnography methods put forth by Spradley (1980). In both studies the researchers were actively involved with the participants, collecting data from a participant observer point of view. Additionally, both studies utilized an authentic learning environment lens as part of their theoretical framework. The differences between the two studies provided an opportunity for comparison. These included: study length, participant age, and dominant gender. Her study was not bound by the time or place of a course or with specific learning objectives;

hence it did not utilize a case study methodology. It had also extended past three months. Aurilio (2009) explored what type of adult learning (ages 35-55) takes place in Second Life, whereas the current study focused on exploring instructional design considerations in a formal higher education setting with the Millennial generation. Within the Aurilio study, the key informers consisted of six females out of seven total informers, whereas out of the current study's 18 participants, the key informers consisted of five males and one female out of six total informers.

According to Aurilio (2009), virtual world learning is: "situated, social, intrinsically engaging and requires a high degree of personal agency." She found that this type of learning is ideal for adult learners and children, allowing for development of "self-directed problem-solvers of concrete and personally meaningful tasks." She characterized the expressive forms and ways of learning: "(1) Learners embody avatars in a 3D graphical space. (2) They are geographically dispersed. (3) They occupy at least two or more social and technological locations simultaneously. (4) Learning is technologically and socially platform-specific. (5) It is socially interdependent. (6) It depends on intrinsically motivating activities. (7) It engenders forms of learning-by-doing (Aurilio, 2009)."

Though all of these were observed in the current study, it is important to note that students may or may not be motivated in a course that is a requirement of a major, which is different compared to adult learners. Additionally, depending on the instructor style, and the design and implementation of the authentic activities, there is a range of how much the students are provided the opportunity for learning-by-doing. Therefore, it is critical to employ formative assessment throughout the implementation of authentic activities by asking questions of industry

experts, ourselves, and students as to whether the learning experience approximates what they might expect in the real-world.

In an analogy where instructional design is to courses what game design is to games and where learning outcomes parallel game goals, it is advised that frequent and varied feedback be employed with Millennials. In particular, Millennial gamers might be especially disengaged when the rate of response is slow. Classroom assessment techniques (CATS) are a way of tracking learner progress in real-time, then adjusting sequencing per need. These mini in-class feedback mechanisms allow for continuous improvement toward

- student time-on-task;
- matching appropriate examples to their unique interests; and
- attending to the zone of proximal development (providing guidance right when it is needed).

#### **Authentic assessment.**

CATS may involve the use of holistic rubrics for chat participation, in-world embedded quizzes, or other in-world teaching and learning tools or games. Authentic assessment tools include in-world recording functionality such as saved chat logs and snapshots, or external screen capture applications such as Camtasia for machinima (Second Life screencasts). Peer evaluation through mini reports at team project milestones might facilitate more effective collaborative learning, as well as assist with the overall assessment of team projects. Self-evaluation through reflective journaling may facilitate assessing individual development and attitude change over time. It may also develop a student-faculty feedback loop.

The amount and quality of learning may be transparent in the assessment of simulations or role-play in a virtual world classroom. Checklists may be used to assess certain procedures and skills. For content knowledge, assignment-based rubrics may be employed. It is advisable that checklists and rubrics be shared with the students depending on the given student body and the nature of the activity. For example, if the activity's objective involves creativity, providing the student with a rubric might be directive. In the current study, despite student requests for more structure, the redesign had to be balanced to offer enough of an open-ended atmosphere of challenge and ambiguity as would be found in a real-world problem.

For authentic assessment in virtual worlds, it is paramount to monitor for the repeatability and improvement of knowledge and skill acquisition, and attitude change over time. Identification of virtual world indicators which correspond to desired outcomes may be challenging indeed, especially the first time the course is adapted to the virtual world. It is suggested that initial drafts of checklists and rubrics be created with the knowledge that adjustments will be made in real time toward their enhancement. Despite the available tools and methods for authentic assessment, it may still be problematic. For example, material which was known prior to the course might be assessed. Alternatively, it may assess in a manner that is preferential to a particular learner type over the other, such as a gamer versus a non-gamer.

In the current study, authentic assessment was aligned to the associated authentic activities the student had a chance to practice during the course. Ideally, authentic assessment reflects the knowledge, types of skills, and attitudes that will be transferable in the subsequent course or job in the field. Authentic learning is probably best judged longitudinally, by evaluating how students fare in similar tasks of subsequent courses or else by what managers

reveal about incoming and sustained student competencies. If tracked students do not pass subsequent courses or else do not meet job requirements, design of authentic assessment should back up. It may be that the design needs to reevaluate its authentic activity design and start afresh from a needs assessment of industry needs, outcome requirements and associated prerequisites. Within the current learner-centered paradigm, it is advisable that authentic assessment not only assess student knowledge of content, but also student competencies in authentic learning strategies and media literacy particular to their subject area.

Currently, authentic assessment in virtual worlds is still in its nascent stage and may require a significant time allotment, especially at the onset. It is probably not practical for classes with more than two dozen students. However, with the advent of virtual world automation and management tools, enhanced instructional design rubrics, and course quality mechanisms, authentic assessment will become more ubiquitous and user-friendly. Future research on authentic activities and assessment should explore and create improved methods and tools, including ways of making them easier to access and integrate in the classroom. For example, the functionality of software for media-rich qualitative data could be coupled with virtual worlds for improved authentic assessment.

Jarmon et al. (2009) explored experiential learning and assessment in Second Life for an interdisciplinary communication course. The research methods used included surveys, journals, focus groups, and analysis of projects. These methods were similar to the current study; however, they included a survey instead of participant observation and interviews. Jarmon's study had a small class size of five, whereas the current study was composed of a larger sample of 18 students. With the smaller sample, inquiry might have been more extensive on each

student, however in the current study there was access to a wider variety of students. Though initially the students had mixed feelings about the use of Second Life, Jarmon et al. (2009) attributed this attitude to SL's steep learning curve and to the fact that the use of Second Life was not directly related to the content of the class. As the semester progressed, however, students became more at ease with Second Life and found it useful in a number of ways (Jarmon et al., 2009).

In the current study, the majority of the gamers were frequently frustrated with both the instructional and technological lack of speed and smoothness as it pertained to feedback. This was somewhat due to the less than ideal graphics card. Their gaming environments had quicker feedback as well as better quality graphics which rendered faster. Though the majority of gamers could maneuver in SL adequately, their larger difficulty seemed to lie either in insufficient motivation and/or self-agency to try out virtual world possibilities. It is possible that increased and varied feedback mechanisms would have engendered more learning engagement. After all, they were not only adapting to college but to a whole new concept of where and how one may learn. Earlier field reconnaissance from the fall of 2008 indicated that students seemed more comfortable with Game Maker's simple drag and drop application, however they agreed that it did not enable for much interaction amongst team members.

Another difference between the current study and the Jarmon et al. study (2009) is that the later included much more traversing between real and virtual worlds. This might have made the transition to the virtual world student project smoother. Yet another difference is that the current study reviews the authenticity of student projects from a researcher's perspective. This is possibly a less biased view than instructor-led studies which may be biased due to student grades

and previous acquaintance with the students. In both studies, the long-term student team projects resulted in reaching learning outcomes through the use of Second Life.

At the end of the term in the current study, a comprehensive assessment included items from the face-to-face portion of the course with items corresponding to the authentic assessment of what was learned during the second portion of the course in Second Life. Though there are not enough students to report on significance, the students did just as well in both portions of the assessment. Despite the aforementioned gamer reservations, learning does not necessarily feel comfortable nor is there always a feeling right away that one has acquired new knowledge. It may be that someday, when graduates of the current study are working on a game development team, they will look back at this course's experience and be able to draw valuable lessons from it.

### **Creation of an Authentic Environment and Community**

Finally, student experience with the authentic context allows us to better understand what is needed to create an authentic context through a virtual world. The course would have an authentic context if aligned to the context of the university culture and technology infrastructure. For example, these may include considerations such as faculty and student comfort levels and readiness with virtual worlds, and available support mechanisms. Faculty members deciding to teach for the first-time in a virtual world and to design an authentic learning environment are advised to conceive of virtual worlds as completely novel ways of being in contrast to mere tools. It is recommended that the instructor be comfortable with using the virtual world at least to the extent to which the students will be using it. It is also suggested, however, that challenges not be attributed to a technology learning curve, but rather, an instructor-as-learner journey



which becomes part of a reciprocal relationship with the students. Though change is difficult and takes time, virtual worlds and games are here to stay, and beyond them there are other innovations under way such as mobile learning, augmented reality, haptic tools, etc. (Hudson, 2008).

Designing an authentic learning context through virtual worlds requires matching of the virtual world's affordances to the learning outcomes. In the current study, these were discussed as part of the authentic assessment findings section of chapter four. The range of customizability of the Second Life virtual world becomes apparent when one considers the myriad of choices regarding

- how one's avatar looks;
- how many virtual avatars and/or skins one may have;
- how many places one may be or communication media one may be using at any one time;
- what one opts to do and what one decides to create; and
- how one behaves by themselves and how in a virtual world group.

Due to the potential of multimedia design to have effects on learning (Sweller, 2005), it is advised that the design of an authentic learning context toward desired outcomes be given adequate time and resources for preparation. Virtual world options may be utilized in the service of learning, yet sometimes they are not accounted for as also competing with the pursuit of learning (Table 4.1.31). For example, resources which may require upfront development include the creation of scripted 3-D labs, as well as finding and organizing in-world course teaching and learning tools and materials. An ill-structured environment which models expertise and coaches

should create an atmosphere where accountability for learning is placed on the learner. Then, the instructor may act as a mentor and guide, providing a variety of examples and learning activities as needed. This would not be possible if the instructor and instructional designer were developing and locating resources simultaneously as the course is being offered.

It is also advised that a flexible design be embedded in courses to allow for adapting to the individual learner and to the needs germane to that class. As in a game, the design could provide different branching choices of how an individual learner may arrive at the desired outcome. For instance, if the class student body does not consist of multiple perspectives, the instructor may ask the students to brainstorm a way to simulate diverse experiences. The instructor may ask: “What can be done to provide for a more realistic representation of the variety of workers you will encounter in the real-world on this project?” In such a way the instructor has turned a potential challenge into an activity and a choice. This may lead to student responses such as ‘interview with multiple perspectives outside of class in SL’ or ‘design for multiple audiences with different perspectives.’ Allowing for student participation and choices may increase the chances for learner buy-in.

One study pointed out how student preconceptions may affect student learning in a virtual world. Cheal (2009) observed that students tended to dismiss work in Second Life as if it were merely play. This led to a suggestion that the resemblance of Second Life to a game may shape student perceptions about learning within it. This was consistent with the current study, especially as students who were more apt to play certain types of game genres actually had less affinity towards Second Life than did the other students. Furthermore, the gamers in the current

study still referred to Second Life as a game, when it clearly differed from an online game or a video game.

Another seemingly minor issue related to the integration of virtual worlds is that there are many different names for virtual worlds. This may lead to confusion and mystification. In order to demystify virtual worlds, there is a need to standardize virtual world nomenclature. Another consideration may be to agree on simpler and less confusing naming of virtual worlds i.e. should they really be referred to as multi-user virtual environments (MUVEs)? Why not a name that is easy to remember such as VR is for virtual reality?

Compared to other social media, which may offer a two-dimensional feeling of immediate connectedness, virtual worlds allow for non-linear dynamics, interaction through 3-D space, and multi-modal communication, which may border on even an uncanny experience of presence. There are some courses that rely on large scale open-ended team projects which could be better served through the use of a virtual world as compared to the use of an asynchronous learning management system. Also, there are also face-to-face course projects whose supplementary activities may be suited for out of class learning through a virtual world.

For example, a course may involve the development of a business plan and running a mini business over the semester. Second Life's economy would be especially conducive to this type of experience. In terms of innovation, there were almost no boundaries for creating imaginative game goals, environments and interactions in the current study. The space was also safe and cost-efficient for experimentation with prototypes and role-play practice. Ultimately, the degree to which virtual worlds are adopted as viable mechanisms for facilitating online or

web-enhanced courses depends on the social milieu of the particular classroom, and whether there is an atmosphere ready for change at the given university.

Schrader (2008) presents a view where today's students are not learning 'about' technology, 'with' technology, 'using' technology; rather they are learning 'in' technology. In other words, today's learner is intertwined with and inseparable from technology. Uniquely, social media such as virtual worlds and other environments such as massively multi-player online games have opportunities for an enhanced online presence, collaborative learning, and a sense of belonging to online communities of practice. The Millennial persona is constantly negotiating complex boundaries between the self and the projected self, between its multiple online personas, thus shape-shifting the overall relationship between humans and technology. In doing so, the learner extends out through Web 2.0 into living rooms and offices across the globe, in a manner that is simultaneously all-powerful yet also potentially crippling.

It is suggested that the possibly disturbing side to the simultaneous access to the plethora of information and people be further researched by asking questions as to the essence of today's student dialogue and activities. Are Millennials really authentically engaged, e.g., lobbying for change, volunteering at a shelter, etc., or, for example, are they merely clicking away on "Like" on Facebook for environmental causes or hanging out at an activist house in SL, and somehow this is measured as real activism? Does ongoing social media activity often fall prey to marketing gimmicks by others, while purporting to be for the creative propagation of the self? Are Millennials really thinking about why they do what they do and how their voices and behavior affect future generations? These questions bring to the forefront media literacy; in this

case, not only competency in critically evaluating and producing media, but being motivated and adept at examining the larger implications of social media messaging.

Teamwork in an authentic learning environment is not satisfactory through what sometimes suffices in higher education, e.g., a group project with divided tasks that might or might not use technology. It is through social interactions that thoughts are articulated and then negotiated with others. Thus, new knowledge is substantiated within a real-world context. In order to create an ideal environment for Millennial learners, it is suggested that training and hiring practices for faculty members require pedagogical skills for active, reflective, and collaborative learning and media literacy, in addition to subject matter expertise. Different applications and time allotments of social media are appropriate for each discipline, topic, and objectives. For the current study, virtual worlds, online games, 3-D modeling, scripting, and game engine simulation were all applicable and timely for an introductory game development course. However, Second Life and other virtual worlds should work on enhancing in-world tools to make them

- easier to use for the general population;
- have easier access to tools which are standard with virtual conferencing tools, e.g., white boards, polling; and
- more specific for certain disciplines, e.g., a scripting language that is more like C++ or 3-D modeling that is more comparable to 3-D Studio Max.

Since virtual worlds are still new frontiers, research and practice should bundle their use with the highly recommended active, collaborative and reflective learning strategies. It is conjectured that this would ultimately lead toward continuous quality improvement of virtual world courses.

Initiatives encourage faculty and instructional designers to create authentic learning environments and to utilize social media such as virtual worlds in education. However, assessment methods utilized in K-12 education and even in much undergraduate education do not reflect authentic learning. Furthermore, they do not assess media literacy. This creates a mismatch for the implementation of authentic learning environments and social media in higher education. At the same time, K-12 educators are pressured to focus on state testing preparation to receive funding, while higher education is expected to align to strict accreditation criteria and grow programs to increase student enrollment. As a result, educators adjust priorities and resources to redesign courses to meet these standards. However, this does not leave much room for creating authentic learning environments that could use virtual worlds for collaborative real-world projects.

If there really is a need to prepare Millennials for the future workforce by using authentic learning environment experiences, and the opportunity to do so by simulating such experiences through the use of virtual worlds, there is an associated need for a commitment to change management for new media and pedagogy integration from all stakeholders and levels of educational leadership. This would include an understanding that such an undertaking involves a complex reevaluation of the current educational system and its existing processes. It would also be beneficial to place an associated value on faculty efforts in pursuing best practices for creating, using and sustaining authentic learning environments in virtual worlds. This may involve appropriate incentives and resources to support the redesign, evaluation, and dissemination of such projects.

Each course which utilizes a virtual world should create an open atmosphere for suggestions and proactively prompt students to provide frequent feedback. This would ensure regular formative evaluation about the use of new media and associated methods. Student commentary should be thoughtfully considered and subsequent adjustments made in order to enhance virtual world learning. As observed in this case study, students have a treasure trove of ideas and it behooves us to motivate their self-expression, document their insights, and improve learning conditions according to their suggestions in real-time.

**Future research questions.**

The following paragraph summarizes future research recommendations for research question one. Future research may duplicate the study to determine whether similar results could be obtained and thus corroborate findings and determine whether new insights could be gained for future directions. This approach is particularly recommended in reference to research question one, where the use of the authentic learning environment framework for Millennials in a virtual world is more theoretically driven, in comparison to the other two more explorative research questions. The study could also be extended to include more female voices, to explore experiences from more diverse cultural and socio-economic backgrounds, from upper class levels and/or adult learner experiences, including different gaming preferences and backgrounds. Other studies could also utilize different virtual worlds and compare results.

**Research Question II Learners****Millennials in a Game Development Course  
and their Perceptions about Virtual World Learning****Male Gamer/Team Leader****Possible design implications.*****Leadership practice.***

The identified leadership characteristics do not have to be idiosyncratic to those with pre-existing inclinations toward leadership. Frazier & Suter (2007) suggested that virtual world simulation could be used to prepare students with leadership skills in order to be competitive in today's workforce. The identified team leader characteristics, which may be related to learning engagement in the current study, may be used for creating instructional design activities and teaching strategies which promote them and provide support for them. This would allow students who need to develop their leadership skills a chance to practice them.

**Teaching strategies: Possible implications.*****Engagement strategies used by Gamer/Team Leaders to motivate their team members.***

A number of strategies were identified which gamers who were simultaneously team leaders utilized to engage their team members. These are listed in Table 5.1, which addresses instructional design and strategies for authentic learning environment engagement through a virtual world.

**Future research questions.**

- How are team leadership characteristics in virtual worlds similar to or different from leadership characteristics in gaming?



- How are team leadership characteristics in virtual worlds similar to or different from leadership characteristics in the current virtual workforce?

## **Gamer and Non-Gamer**

### **Possible design implications.**

#### ***Virtual world barriers.***

According to Rice (2009), even though educational video games may lead to better understanding of abstract concepts, experiential learning, and team building, qualitative analysis of educational video game research studies revealed six barriers to implementation of computer video games in education. Though Second Life is not a game, this study was consulted in order to compare the resistance that had been expressed toward educational video games to the resistance that gamers expressed towards the implementation of an authentic learning environment using Second Life. The following three barriers coincided with the findings from the current study

- negative perceptions toward video games as educational components;
- difficulty of providing state of the art graphics in educational video games; and
- lack of adequate computing hardware in the classrooms to run advanced video games (Rice, 2009).

According to Hudson K. (2008), there may be resistance in generating interest in Second Life projects in higher education. He advised that it might take time to adjust to the virtual world desktop medium, as it had only recently emerged on a larger scale.

#### ***Social media, virtual worlds and online games: Cultural differences.***

It may be that SL residents who see their identity as extending into the virtual world experience a richer and deeper level of belonging and commitment to their virtual world learning community than do other social networking users with theirs (e.g. Facebook, Twitter, etc.).

The Second Life learning community revolves around building and sustaining an alternate reality world which is personally relevant to its users. Likewise, gamers report they experience an alternate reality world within their gaming environments. Since Second Life culture is so unique and different in comparison to those of gaming environments, what might actually be occurring vis-à-vis gamer reticence toward Second Life is a virtual culture-shock, perhaps even a virtual cultural bias.

***Media options between Second Life, online games, and custom solutions.***

If a virtual world is the media selected for gamers, it should be integrated with caution. Namely, there may be an existing gamer reticence toward the use of Second Life, making integration more challenging in comparison with other populations. It may also be useful to explore other options such as an existing online game or a custom virtual world solution. That said, if the chosen game was not specifically created for educational use, it may be difficult to appropriate it to a variety of subject areas due to its learning curve, cost, and/or applicability. In an interview with Nathan, we discussed the use of WOW, and how that would involve a significant learning curve, cost per license, and it would not be as scalable as SL because it would only be applicable to certain subjects. Creation of custom virtual world solutions may not only be time consuming and costly, but in the end, perhaps not as authentic as Second Life, which is the most widely used and diverse of virtual worlds. Leveraging Second Life or an equivalent environment as a university-wide solution would be recommended.

***Design ideas from games.***

To engage gamers and Millennials overall, learning context and activities in virtual worlds may be designed to mimic game-like challenges. For example, activities may include quests as active learning strategies. Ranking could also be used to show a competitive status of how far a student has progressed within levels of expertise. Since gamer satisfaction is also influenced by the quickness of real-time updates, it is suggested that quick feedback be applied to learner interactions. The immediacy of responses could also increase the perception of online instructor presence.

The difficulty that arises from such designs, however, is that they may start to become similar to familiar online games. As such, opportunities for real-world critical thinking and collaboration skills may decrease along with the complexity of an authentic learning environment. Unique student identity representation, 3-D environment development (sometimes referred to as world-building) and real-world projects provide practice with creativity, collaboration and comfort with ambiguity. Practicing these skills is not necessarily available with some games, especially those that are structured and domain-specific.

**Teaching strategies: Possible implications.*****Non-gamers more likely to engage with Second Life.***

Non-gamers appear more likely to engage with the virtual world of Second Life than gamers. In essence, they have more curiosity about the possibility of becoming engaged in a completely different environment. However, they are also more likely to experience a slight discomfort due to the initial newness of it all, especially in the beginning.

***'Learning curve' or socialization within a complex social media?***

I question 'the learning curve' of Second Life that is often discussed as a barrier to its implementation. It may be that what is referred to as 'the learning curve' is in actuality a discrepancy between a new user's assimilation level and a seasoned resident's experience in their second life. This differs from merely learning how to use a new technology or tool. For instance, when comparing the use of Facebook to Second Life, a new user may quickly become technically proficient in both for basic communication purposes. In terms of socialization, however, a new user of Facebook may feel comfortable within a day or so, and from there on, be quickly attaining social networking gratification on a regular basis. In contrast, if a new user wished to become socialized within Second Life to the level of its seasoned residents, including all that comes along with assimilation to a new culture -- such as behaviors, artifacts, and mores - - it would probably take longer. Hence, it is important to stress that being in Second Life is not simply a use of a new tool or technology, but an adaptation to a unique social media context. Complete assimilation (e.g. 3-D building, acquiring skins, belonging and contributing to groups, tec.) is not required to achieve some of the inherent educational potentials of a 3-D virtual world such as Second Life.

***Strategies for using Second Life with gamers.***

If Second Life or other virtual worlds are used for educational purposes with gamers, learning facilitators should be fluent in the virtual world, so that their unfamiliarity does not pose a barrier to learning. Moreover, in a gaming concentration, educators' use of the virtual world should extend to understanding the culture of the gamer. Since gamers became engaged through discussion of the games they play and relevant gaming news, strategies may include subversive discussions about game theory and development by eliciting discussions about these topics. For

an authentic learning environment, it is advisable that the instructor be knowledgeable not only in core content, but also be an active game developer practitioner in the field, in this case, perhaps even a seasonal gamer. This suggestion would extend to other disciplines as well.

Suggested teaching strategies involve seizing upon gamer challenges with SL and turning them into engaging authentic activities. Field trips to games in SL and to in-world game resources might provide useful models of how students may create games themselves. Though there certainly was collaboration in the current study, gamer behaviors tended toward competition. This might be expected of certain gamers and types of games, e.g. first person shooter (FPS) games. In the study, collaborative learning strategies could have benefited from additional coaching on how to manage team roles and rotate them, and on how to set team expectations and balance team dynamics. Additionally, adequate time is suggested for team building.

**Future research questions.**

- How would Second Life and/or other virtual worlds need to be modified in order for gamers to view them as legitimate learning environments?
- What differentiates gamers who prefer MMORPGs to strategy to FPS games in terms of how they experience virtual worlds (Is it merely a matter of preference? Maturity? Or?) Does being a predominantly MMORPGs or strategy gamer versus a predominantly FPS gamer influence critical thinking competencies?
- To what extent and why might non-gamers have more of an affinity toward Second Life in comparison to gamers?

- Do upper-level non-gamers have more of an affinity toward Second Life as compared to freshman and sophomore non-gamers and if so, why?

## **Underrepresented Student**

### **Possible design implications.**

#### *Design to encourage exploratory learning.*

If the course calls for communication skills and the development of empathy, it may be advantageous to design activities in Second Life that utilize role-switching and debriefing about feelings. Activity design may also incorporate sharing of resources and expertise to allow for competitive gamer types to learn from others about non-competitive collaboration. This may have the added effect of increasing the underrepresented learner's confidence, perhaps even lead to exploratory learning behaviors.

### **Teaching strategies: Possible implications.**

#### *Monitoring clarification and course structure needs for ESL and underrepresented students.*

In Liang's (2009) study involving a semester-long collaborative, global project in SL, 20 English-as-a-second-language (ESL) students reported being comfortable in roles which were equivalent to those interpreted in the current study. They rated themselves approximately four on a five point scale in the following five roles: providing information, sharing writing styles, understanding cultures, asking questions, and exchanging opinions (Liang, 2009). The roles they identified with included behaviors which were clustered around sharing, collaborating, and asking for clarification. They scored themselves at approximately three and a half or below for the remaining five roles which clustered around extroverted expression and being comfortable

with ambiguity (Liang, 2009). Liang (2009) recommended that ESL students explore the virtual world beyond the classroom, a suggestion which was also given by the gamer/team leaders in the current study.

Underrepresented students, including the female perspective, were comfortable with sharing and non-competitive collaboration. Underrepresented students from different cultures appeared to have difficulties in understanding certain tasks; hence, they asked a number of questions. They also demonstrated reluctance in exploring unknown situations. It is suggested that instruction should gauge the constitution of the underrepresented population to determine how much stress should be placed on clarifying whether material and assignments are understood. Learning engagement strategies that were recommended by gamers who were team leaders may also be employed such as structure, repeatability, and the use of various communication tools (Table 5.1).

***Millennials may be particularly accepting of diversity.***

In the incident where a stranger entered the class without any avatar clothes on, with an obvious intent of disrupting the student experience, the students acted with a surprising level of acceptance. They proceeded to help in solving the problem by banning him, versus engaging with him to disrupt the class any further. The student reaction coincided with the PEW research study where the Millennial generation was found to be exceptionally liberal, accepting, positive, and proactive about solving technical or other problems (Taylor & Keeter, 2010).

***Use of gender cross-representation toward enhancing understanding and competencies.***

Park et al. (2008) explored the role of Second Life in mutual understanding of gender roles and the flexibility of identity representation. Though this study's participants were younger than

the current study's, it was nevertheless illustrative of how positive values could be acquired about others' gender identification via cross-representation activities (Park et al., 2008). The activities enabled real-world simulation of identifying with different roles and practicing discourse from the perspective of the other.

Despite the fact that findings from the current study require further substantiation due to a small underrepresented population, it is worth noting that designing role-switching activities might lead to enhancing the following

- female group and other underrepresented competencies in being comfortable with ambiguity (of the type related to challenging pre-established rules and authority structures) to the level of male gamers; and
- male gamer competencies with sharing and non-competitive collaboration to the level of females and other underrepresented groups.

Thus, it is advised that female student and other underrepresented students be encouraged to experiment with boundaries, especially in technical courses where they may be in the minority. In conjunction, it is also advised that males be encouraged to exercise their collaboration skills, especially skills that are not necessarily linked to competitive goals.

**Future research questions.**

- By what means might language use in a virtual world predetermine how an underrepresented group is identified by a majority?
- To what extent could certain students be underrepresented in virtual worlds, MMOGs, and the gaming discipline due to access privileges and interests of their socio-economic backgrounds?



- Why might Second Life be more appealing to females than males in terms of time they are willing to spend in-world? Yet, why is there not more representation of females in game development careers or in MMORPGs which have similarities to Second Life?

### **Low Motivation Student**

#### **Design and teaching strategies: Possible implications.**

#### *Toward engagement within an authentic learning environment through a virtual world.*

Table 5.1 lists the case study recommendations for design and teaching strategies for engagement within an authentic learning environment through a virtual world. Gamer/team leader suggestions for engaging their team members are listed first. These strategies may be lessons learned for those facilitating instruction in virtual worlds. The rest of the case study recommendations for engagement are listed according to how they were analyzed with respect to Keller's (1987) ARCS Model. Recommendations are categorized into design and teaching strategies and some fall into both.

Students with low motivation were not necessarily motivated irrespective of methods or media. It is important to note that this implies that having this learner subgroup may affect results of a study dealing with methods and media. Also, the category of 'low motivation' may not be all-inclusive as to all the rationales these types of students might not have been as active. For example, there might have been a student with a learning disability which might exclude motivation. However, the design and strategy recommendations for engagement within an authentic learning environment through a virtual world in Table 5.1 do not just apply to students with low motivation but for enhancing learning engagement for all students.

Table 5.1

*Instructional Design and Strategy Considerations for an Authentic Learning Environment through a Virtual World*

	D <sup>a</sup> , S <sup>b</sup>	Recommendations
Gamer/Team Leader Suggestions	D/S	<ul style="list-style-type: none"> <li>Be organized and transparent, even repetitive</li> </ul>
	S	<ul style="list-style-type: none"> <li>First engage them in small or easy tasks to get them involved</li> </ul>
	S	<ul style="list-style-type: none"> <li>Communicate through multiple communication venues</li> </ul>
	S	<ul style="list-style-type: none"> <li>Use creative strategies particular to individuals</li> </ul>
	S	<ul style="list-style-type: none"> <li>Provide an open line of communication</li> </ul>
Relation to ARCS Model		
<u>Attention</u>	D	<ul style="list-style-type: none"> <li>Pitch team project as a joint adventure and challenge in order to simulate a feeling of a challenging quest in a popular game</li> </ul>
	D/S	<ul style="list-style-type: none"> <li>Create learning-by-doing (authentic) activities versus lecturing</li> </ul>
	D/S	<ul style="list-style-type: none"> <li>Sustain attention using pre-designed prompting questions with accountability such as participation points</li> </ul>
	D/S	<ul style="list-style-type: none"> <li>Balance structure with media richness (Too much structure tends to rigidity and lack of opportunity for creativity; too little increases odds for distraction and/or confusion)</li> </ul>
<u>Relevance</u>	D	<ul style="list-style-type: none"> <li>Explain rationale for using virtual world in relation to the course goals</li> </ul>
	D/S	<ul style="list-style-type: none"> <li>Maximize learning opportunities unique to the virtual world (e.g. exploration, world building, virtual world socialization, etc.)</li> </ul>
	S	<ul style="list-style-type: none"> <li>Use student-relevant and current real-world topics to facilitate discussion and activities about new materials</li> </ul>
	D	<ul style="list-style-type: none"> <li>Monitor student interest and questions, and adjust accordingly</li> </ul>
<u>Confidence</u>	D	<ul style="list-style-type: none"> <li>Require students to complete virtual world assimilation activities and practice prior to class starting, and assess these at the onset of class to determine further needs</li> </ul>
	D	<ul style="list-style-type: none"> <li>Design game-like activities that require competitive yet attainable team goals</li> </ul>
	D	<ul style="list-style-type: none"> <li>Pre-assess content knowledge and student level of experience in team activities, then place students in differentiated teams</li> </ul>
	S	<ul style="list-style-type: none"> <li>Assess individual student progress in relation to their beginning to later competencies, as opposed to how they compare to others</li> </ul>
<u>Satisfaction</u>	S	<ul style="list-style-type: none"> <li>Get to know students on a one-on-one basis as much as possible, providing them with personally-relevant positive reinforcement when they successfully complete a learning task</li> </ul>
	D	<ul style="list-style-type: none"> <li>Make sure students have adequate hardware (e.g. graphics card) and connectivity, use USB for Second Life Viewer portability, have back up plans, and provide quick and reliable technical support</li> </ul>
	D/S	<ul style="list-style-type: none"> <li>Choreograph and facilitate a dynamic class session flow</li> </ul>
	D/S	<ul style="list-style-type: none"> <li>Design and facilitate activities that have regular, varied, and authentic peer and instructor feedback</li> </ul>

Note 1. <sup>a</sup>Design, Note 2. <sup>b</sup>Teaching Strategies

**Future research questions.**

- What are different types of low motivation in a virtual world and how are they usually distributed among learner types? What are their indicators?
- How might motivation within virtual worlds be systematically enhanced through the use of both the gaming concept of ‘flow’ and the ARCS model?
- What are best practices for sequencing and facilitating co-creation and role-play in a virtual world in order to maximize learning engagement?

**Factors which May be Related to Engagement in an Authentic Learning Environment through a Virtual World**

The gamer/team leader characteristics that were identified included ‘comfort with ambiguity’, creativity, and collaboration as well as self-agency and a continuous learning. These same factors are ones with which the remainder of the class had challenges with. The fact that gamer/team leader students were high performing and highly engaged as well as possessed these characteristics indicated that the characteristics may be related to engagement in an authentic learning environment through a virtual world. This is not to imply that all students who exhibit these characteristics necessarily do well. However, designs and strategies with constructs that facilitate these skills may assist in enhancing an authentic learning environment through a virtual world. Namely, we can infer from these students successful ‘ways of modeling’ and ‘ways of coaching’ in virtual world education. This includes the creation of a safe environment which is

- accepting of being wrong at times;
- encouraging toward trying new solutions which may lead to creative outcomes;
- open for asking questions and practicing collaboratively;

- actively scaffolding and providing positive reinforcement; and
- communicating high expectations of authentic learning engagement and collaboration.

**Future research questions.**

- In a longitudinal study, do instructional design and teaching supports for ‘comfort with ambiguity’, creativity, and collaboration increase the likelihood of successful learning outcomes within an authentic learning environment through a virtual world?
- How could self-agency and a continuous learning attitude be measured through a virtual world? Enhanced?

### **Research Question III Virtual World**

#### **Virtual World Effects on Communication, Environment Development, and Collaboration during the Lifecycle of a Real-World Team Project**

##### **Virtual World ‘Communication’ over the Lifecycle of a Real-World Team Project**

Use of a virtual world allows for quick access to highly specialized information, enhanced performance for certain tasks, quick mediation of connections and communications, visualization, and manipulation of one’s 3-D identity and surroundings. All of these may be put toward the service of learning. One inferred phenomenon of virtual world communication is that our language is continuously morphing in our interaction with one another through the medium. Gao (2009) found role-play in a virtual world is comparable to that of face-to-face role-play, however, he also stressed that communication styles are different, characterizing virtual world ones as shorter and more frequent. This was similarly found within the current study.

In Table 4.3.11, it can be seen that the language is not only morphing in terms of how it looks, i.e., short, but that meaning is also in flux and a continuous state of negotiation. It is by closely studying new media and current learner generations, as in this case study, that we come to understand what lies behind the emerging communication styles. In the current case study, one could express their feelings, state, and decisions with relatively short and abbreviated messages. The shortened words, emoticons, and blurbs of thought tend towards communication characterized by symbols.

Beyond understanding the learner in terms of how to design a better learning experience, that understanding may also be used to guide the learner and instructors new to the virtual world and other social media to be critical consumers and producers of media. There is a lot more that

can be accomplished in education with respect to virtual worlds and other social media which is beyond what is usually the norm, i.e., socialization and consumerism. In a recent study by Brooks (2010), the majority of students answer yes when asked whether media literacy is participatory; however, when asked to define it, only a small number of them actually defined it in active terms. This illustrates that not all of us are speaking about the same concept when we refer to media literacy. Media literacy definitions are still in the process of being clearly articulated and negotiated, as was the case in the past with visual literacy (Steels, 1983). Considine et al. (2009) explain the discrepancy with regards to the notion of Millennials as media savvy students, when in fact there is a lot more to be learned in order to become critical consumers and producers of media.

The adoption of new media within the course is largely determined by the readiness of the particular university culture, as mentioned in chapter four, in the third part of research question one – authentic context,. Too often instructional designers are asked by faculty and administration: “What is a good technology for this discipline, and will it work?” Some tools simply need to be piloted in a thoughtful manner within the native context in order to determine whether there is a fit. Currently, there is so much variability in new media, and so many different contexts that both instructional designers and instructors are being called to be leaders in researching best practices for innovative teaching and learning.

Merriam (1998) describes the researcher as the central instrument in qualitative data collection and analysis. For example, one way the researcher may contribute to the field is through self-study. Sullivan (2009) modeled self-study practice with a course in Second Life, presenting her iterative revisions of design and teaching methods to match student needs. She

pointed out how student expectations and prior knowledge with use of technology in the classroom have an impact on adoption as do issues of student safety, especially when the classroom is linked to social technologies (Sullivan, 2009).

Table 5.2 illustrates the participant researcher self-study with respect to virtual world communication media effects throughout data collection and analysis methods. The inferences about the virtual world in Table 5.2 occurred as a result of an extended period of participant observation and data collection through various communication tools in the virtual world. These insights helped to better understand different communication tools, thus adjusting virtual research methods. Table 5.2 inferences could also be applied to teaching and design. The matrix illustrates technical, disclosure, challenge, and archival effects of chat, audio, and multi-modal and spatially interactive communication in 3-D. For each media type, key effects are described. Others have even analyzed just components of the virtual world such as instructional design considerations for the avatar (Blake and Moseley, 2010). It is by working through and understanding the benefits and challenges of different media communication tools within the larger virtual world context that better conditions may become available for learning to occur.

Table 5.2

*Media Effects of Virtual World Communication Tools (Self-Study: Participant Researcher Perspective)*

Communication Type	Technical	Disclosure	Challenge	Archival
<u>Chat or Instant Messaging</u>	Individual typing speed differences, Easier to have a record of chat	Language scope and usage reveals background; the act of writing may be seen as 'doing'	Possible disassociation with accountability (more likely to occur when anonymous)	Who was chatting written, transcript from what was said, what IP address was used
<u>Voice Chat</u>	Faster transmission compared to text chat	More immediate than chat; the act of talking may transfer a sense of 'feelings' from voice inflection	Time needed for transcription of voice chat	Who talked to who recognizable, voice recording, what IP address was used
<u>Multi-modal and spatially interactive communication in 3-D</u>	Radically different expertise levels (simultaneous management of multi-modal communications in 3-D, multiple data sources, tools, and windows); privacy low – lots of possible archive data	Increased transparency; levels of engagement increasingly observable, which may indicate levels of 'motivation'; May reflect both real-world and fantasy desires	Differences in the types of previous experiences with media and respective virtual world assimilation (e.g. Assimilated or not?, Want to be or not?, Assimilated through some other virtual world and want to add on or not?)	Who was chatting written, and who talked to whom recognizable, what IP address was used, data on what landmarks visited and what types of objects inspected/bought, how representing self and surroundings visually, how much and how time spent in-world



### **Virtual World ‘Environment Development’ over the Lifecycle of a Real-World Team Project**

In addition to university culture support, early adopter efforts require adequate technological infrastructure and instructional technology support, but perhaps most importantly to gauge from the instructor and students whether the creation of their own authentic virtual world appeals to them. As in the current study, the students wanted to be active, but it did not completely do so until the latter Phase III of the project, which included development, role-play, and reflection. Although early on they were doing equivalent activities, it was not until the end that all of the components came together into a unified whole. Only then did some of the students start to see all the possibilities, even some fun in creating a world of their own.

In the current study, analysis of identity through avatar representations either mirrored the self or was completely fictional. Leonard et al. (2010) pointed out that the relationship between identity and computer-mediated communication was complex and reflective, and connected to our motivation to communicate with others. Robbins (2006) described the nature of the virtual world classroom environment as unique in that it allowed for the leveling of the classroom authority roles so that traditional boundaries could be tested. In the current study, the course was more learner-centered which made it more egalitarian.

Table 5.3 is a taxonomic analysis which summarized processes and strategies suggested for virtual world integration. It is the result of an extended period of self-study as participant researcher in the virtual world, both through earlier field reconnaissance and the current study. It is through understanding the technical and cultural system unique to a particular context that

corresponding new social media may be integrated as outlined in Table 5.3, and eventually, best practices may arise for greater adoption of virtual worlds.

Table 5.3

*Taxonomic Analysis – Virtual World Integration Considerations for Higher Education  
(Self-Study: Instructional Designer Perspective)*

Taxonomic Analysis: Means - End		
Included Terms	Semantic Relationship	Cover Term
	is a strategy for	virtual world integration
<u>Research</u>		
Exploration		
Needs, problems, and questions		
Scaling-up and reusability		
Piloting opportunities		
Resources		
Technology infrastructure, integration resources, and support mechanisms		
Cost, competitor alternatives, and add-ons		
Successful implementation examples		
Communication		
Participating in external and internal learning communities		
Creating interest and buy-in (grass-roots and administration)		
Developing an implementation plan		
<u>Design and develop to align to university context</u>		
Institutional-level		
Institutional culture		
Institutional strategic plan and initiatives		
Program goals		
Course-level		
Course goals and objectives, and 3-D development needs		
Authentic learning project macro objectives		
Class session objectives and sequencing of activities		
Student body characteristics		
Instructor teaching style		
Existing technology infrastructure		
<u>Utilize new media with continuous improvement</u>		
Providing adequate resources and support		
Technical infrastructure resources		
Instructional technology support		
Instructional design support		
Recommendations for future management and sustainability		
Continuously evaluating and implementing modifications		
Gathering feedback for continuous improvement		
Documenting lessons learned		
Recommending and implementing findings for improvement		
Re-evaluating modifications		
Marketing successes		
Scholarship of teaching and learning with technology		

Konstantinidis (2010) sought to examine the transferability of the fish bowl and jigsaw collaborative learning strategies to the SL virtual world by augmenting it with additional tools. Visualization tools were employed such as the query tool and the idea tool, indicating when a student was asking a question or when a student had an idea respectively. Learning spaces were designed and utilized to support fish bowl and jigsaw collaborative learning. The study suggested that face-to-face interactions may be supplemented through SL distance learning using communication and collaboration opportunities. For effective collaboration, it was advised that SL metaphors and affordances be augmented or else developed (Konstantinidis, 2010). Similarly, in the current study, color-coded geometric shapes sufficed as team gathering spaces.

Oishi (2007) recommended a middle ground between virtual worlds and games. According to her, the virtual game Whyville fuses the best of both worlds for instruction - gaming and an online community. Whyville is being used by organizations such as NASA, the Getty Museum, and the University of Texas Health Science Center. It offers intentionally designed content-heavy games with learning resources; however, it does not feature a 3-D environment. Her stance on Second Life is insightful for instructional design, highlighting that for learning to occur the use of multiple learning channels is preferable to one channel and that working together is preferable to working alone. She also compares the virtual world environment back to the classroom environment, stating that while the three motivators of virtual worlds – personal identity, personal goals, and personal interactions may be present, they may just as likely be accomplished in a classroom which honors self-expression, uses relevant problems, and promotes a learning community (Oishi, 2007).

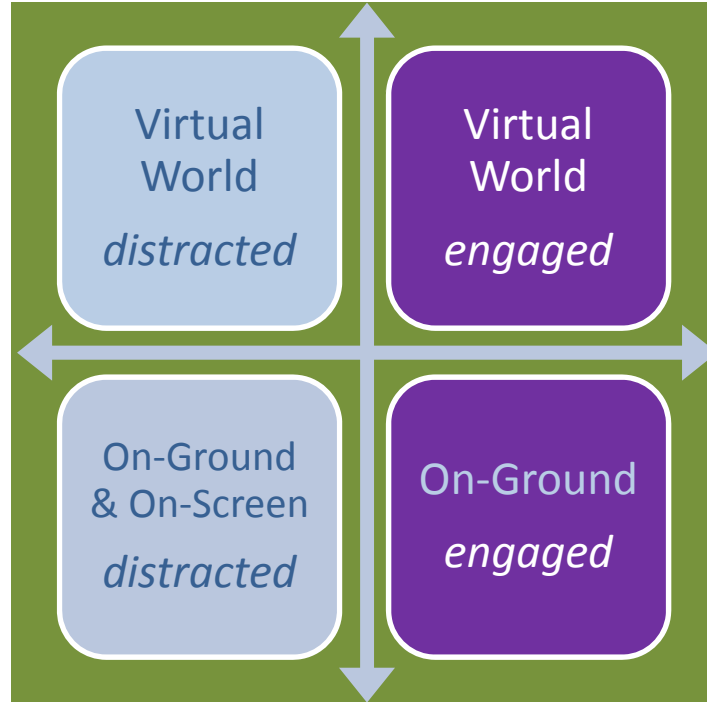
### **Virtual World ‘Collaboration’ over the Lifecycle of a Real-World Team Project**

Enhancement of team communication and student development of the environment increased the chances of collaboration and creation of a learning community over time. Since the nature of the virtual world of SL is organic and always morphing, both locally and at large, it may be interpreted through the activity theory lens. The Barab et al. study (2004) was longitudinal; it arrived at time-tested prescriptions for teaching and learning for a 3-D educational game environment using the precepts of activity theory. Whereas in a traditional 3-D online game, there are rules, constraints, and a limited set of shared meanings, Second Life is not that structured, nor does it have explicit goals. As interpreted through the “activity theory paradigm” (Nardi, 1996), Second Life’s individual and collective meaning-making is in a state of continuous deconstruction and reconstruction. Though for most MMOGS all artifacts and events are related to some type of goal, in SL every creation and action does not necessarily serve a purpose, at least not one that is necessarily obvious right away. For example, a student might visit another island during team work time, though neither the visited place nor the excursion would be related to anything in particular; however, the place may later become an in-world resource. Conversely, most behaviors and actions in online games are intentional towards competitive goals or entertainment ends. Though the game Open Sims is in some ways similar to SL because it is a real-world simulation, it is a cause and effect game, which has finite possibilities.

O’Connor (2009) examined best practices for virtual world design in three graduate courses. Compared to the current study, the students were not undergraduates and not as likely to be gamers. The acclimation to the virtual world was quick in the three courses. Furthermore,

the students reported to have made connections to the real-world based on their virtual world experiences (O'Connor, 2009). Overall, the researcher positively described SL's collaborative learning affordances, also pointing out that Second Life is a powerful and rather distinct instructional environment (O'Connor, 2009).

The extent to which the authentic learning environment through a virtual world tends toward collaboration and a learning community depends on the make-up of its learners, their respective virtual world communication styles and abilities, and their world-building and collaboration competencies and drive. The model in Figure 5.1 was created to illustrate the variability of authentic learning environment engagement in a virtual world. Understanding the types of distractions that are possible in a virtual world was explored in research question one, part three about the authentic context (Table 4.1.31). This type of knowledge allows us to better understand and design activities and strategies for optimal engagement. Gathering reflective feedback from students allowed us to dig deeper into the reasons why they were more engaged at certain times rather than other times. Activities such as co-creation and role-play were by their very nature more conducive to learning engagement in a virtual world. Hence, learning engagement was more likely in class sessions that were choreographed to include a variety of those types of activities.



**Figure 5.1** Virtual World ‘Environment’: Learner Locus of Attention

In this chapter’s research question two discussion about motivation, Table 5.1 presented design and teaching strategy recommendations to increase engagement within an authentic learning environment through a virtual world. A number of key recommendations are highlighted below:

- Student development of simulations and role-playing types of activities are suggested to approximate the real-world, with both individual and collective active learning opportunities toward a common goal.
- Millennials could have difficulties with collaborative and/or reflective learning in the real-world, and these challenges would likely transfer to the virtual world, yet be even more transparent.

- Second Life affordances are ideal for providing students with practice on large scale ill-structured problems (open-ended, design-based, project-based, problem-based learning); however, this requires progressive sequencing of learning building blocks that is engaging and systematic for the particular discipline.
- Due to the many components competing for learner attention, such as the real-world computing environment, the overall screen and the online environment, and the virtual world external to the classroom, Millennials may be distracted. Therefore, it is important to be adequately fluent with virtual worlds, to be genuinely active with the students and to devise ways of utilizing CATs so that interaction becomes a mutual learning benefit.
- Design and teaching in a virtual world may be modeled after gamers who are team leaders, especially if they play a variety of game genres and lead their teams to successful outcomes. Supports for creativity, collaboration and comfort with ambiguity are especially encouraged.
- Millennial cultures, such as those of gamers, might be predisposed not to adopt the virtual world, whereas non-gamers might take to it more readily.
- ‘Learning curve’ difficulties with virtual world integration could actually be biases from different virtual cultures and/or misrepresentations of a virtual world as a mere tool.
- Due to previous experience or backgrounds, some students might not be as engaged because they are not as fluent in the medium. Attention to their needs and use of a variety of strategies to boost their confidence are advised.



### **Future Research Questions**

- Once communication becomes more pictorial, might instructional design concerns of text and images competing for the same channel tend to become less of an issue? What might become more of an issue or a new issue of concern?
- How do communication, student-created environment, and collaboration change in a longitudinal study?
- What are best practices for creating a virtual world learning community within a formal learning context?

### **Limitations of the Study**

#### **Technology interoperability.**

There were a few technical limitations in terms of hardware used. Though the university provides all undergraduate students with a laptop, the graphics card used during fall of 2009 was not optimal for Second Life graphics. There were also rare technical difficulties with dropped connections or incidents when laptops froze up. For these occasions, loss of individual contact did not last long as the student could log quickly back on. These technical issues may have also occurred because of individual laptop and Second Life viewer settings, and/or students' running other applications in the background of Second Life.

The technical issues might have affected the study slightly by necessitating adjustments to time spent on trouble-shooting and then time catching up. In a few occasions, it was also challenging not to have technical support for Second Life. Technical issues might have contributed slightly toward any negative attitudes about learning within Second Life, despite the fact that these issues might not have been due to Second Life itself.

**Course design implementation.**

Second Life guidelines were provided to students prior to Second Life use. The guidelines addressed topics of academic conduct in a virtual world, including identity and safety considerations. Other resources were also provided such as links to relevant YouTube tutorials, links to the Second Life Help and FAQ web pages, and the Second Life Quick tips documentation. However, the instructor and approximately < 25% of the students experienced some challenges with getting used to the technology. This might have impacted the study by extending the time for virtual world assimilation.

The instructional designer, in this case - the researcher as well - provided the instructor with guidelines on instructional design and teaching strategies toward an authentic learning environment and the integration of Second Life. Some of the recommendations were employed only at times and this may have been due to the instructor's unique teaching style and course planning practices. It may have also been due to the instructor's more traditional teaching background. After all, this was a very new type of course for the instructor, utilizing the authentic learning environment framework to teach game development through a virtual world for the first time. In summary, the instructor's preferences, background, and participation in a completely novel teaching and learning context might have had an impact on the results of the case study. For example, certain virtual world effects could not be as neatly mapped back to the authentic learning environment conditions because of certain gaps between the suggested and the actual course design and teaching practices.

**Methodology.*****Participants.***

In order to safeguard against possible researcher bias, researcher reflections were kept in a journal to document possible pre-existing inclinations. With respect to methods, the journal data collection method is sometimes questioned due to its self-reporting nature. Recursive analysis with multiple sets of journal data created a rich, aggregated case study data set. Triangulation through multiple methods and sources added to the trustworthiness of data from the journals.

Due to methods that were conducted in the virtual world, the researcher did not see communication which would ensue from the interviewee face and body language. As a result, facial and body language data was potentially lost from the lack of visual interaction. However, this was addressed through facilitating face-to-face focus groups. This data collection method provided an additional data set for the participants and their team interaction.

***Generalizability.***

The case study was underrepresented in gender and cultural background diversity, which is something that could not be controlled about the sample. However, it is suggested that diversity be further explored in future studies. The benefits of this case study help us understand how a Millennial student body in a game development course of a specific context responded to an authentic learning environment in Second Life. The findings of a case study may be applicable to environments which approximate the current study's learners, have equivalent courses with large real-world team projects, and arise from a similar university context. The

case study gives an in-depth analysis of one particular context and highlights areas for future inquiry.

### **Significance of the Study**

#### **Instructional design factors for authentic learning multi-user virtual environments.**

This case study may have implications for instructional designers and higher education faculty interested in creating real-world learning experiences with opportunities for interaction and immersion through the affordances of a virtual world. The findings illuminate instructional design and strategy considerations when creating this type of instruction with Millennial generation learners and gamers in particular. These include supports for active, reflective and collaborative learning strategies, design implications for authentic activities and assessment, and community and environment attributes for the creation of an authentic learning context. The preliminary factors may be used as a baseline for further research on enhancement of learning engagement in authentic learning multi-user virtual environments. The study may also be applicable to instructional design constructivist studies in general.

#### **Understanding of Millennial generation learners of a game development course.**

The study may contribute to understanding learner characteristics of the Millennial generation with respect to formal education in authentic learning environments through virtual worlds; however, this is limited to contexts which are similar to the current case study. Learner types are identified within a game development course and discussed in terms of their learning experience within the virtual world of Second Life. For example, gamers who were leaders exhibited learning engagement, some of their characteristics including comfort with ambiguity, creativity, and collaboration. This type of information may help in the design of virtual worlds

or similar environments, by specifying what types of supports or pre-requisites may be needed for engagement within an authentic learning environment of a virtual world in higher education. Gamer perceptions of learning in a virtual world were also explored which may aid in understanding how these environments may be better designed and facilitated for this subculture. Due to the lack of participant diversity in the current study, it is recommended that future studies include a more diverse Millennial generation population.

**Preparation for global hybrid/virtual world work environments of the future.**

This study may be relevant with respect to national interests as well. For example, during the summer of 2009 NASA issued a grant calling for the exploration of instructional design, usage, and evaluation of virtual worlds and multi-user online games. Namely, “inspiration and education” was one of five NASA Global Exploration Strategy themes in 2009. The goal of the current study relates to exploring how future generations may have an alternative to current course management systems, with opportunities for greater immersion and interactivity in both online and web-enhanced courses.

In the current study, a virtual world was conducive to collaborative learning, especially within the context of sustained projects, problem-based-learning, and design challenges. For example, supplementing face-to-face instruction in MUVES or online courses through MUVES could provide an opportunity for critical consumption and creation of new media. Authentic activities for the discipline may be particularly facilitated through co-creation and role-play.

The current study aids in providing new horizons for quality improvement of higher education virtual world instructional design in a particular context. In particular, it may help better understand what is needed for learning in a virtual world of today’s students by studying

their communication, environment co-creation and collaboration practices. The case study could be used as a baseline for further research about adoption of virtual worlds in higher education.

Additionally, as online programs increasingly seek to reach out to wider audiences and leverage expensive course management systems, the use of future virtual worlds may become a viable solution. Some audiences might also be reached due to the low cost of required technology. As virtual worlds become more prevalent, there will be further blurring of boundaries between real and virtual worlds resulting in more hybrid worlds. Understanding the differences and specifying how to design and facilitate instruction when moving from one medium to the next may become progressively more useful for educational and global virtual work environments.

### **Summary**

The current study may benefit similar environments or studies in related research settings or with similar participants. Findings from this qualitative study may provide insights for educators, instructional designers, trainers, and administration considering using an authentic learning environment framework with virtual world integration. Its focus on the successes and challenges of a grass-roots virtual world implementation, with a specific learning approach, and a particular body of students make it a holistic attempt at understanding contextual learner needs for facilitating real-world team projects. In summary, the descriptions, inferences and critical reflections might effect change for best practices toward contemporary and future instructional design and virtual world integration in higher education and beyond.

**APPENDIX A PARTICIPANT RECRUITMENT AND RESEARCH APPROVAL**

## A.1 Introduction Letter

October 7<sup>th</sup>, 2009

Dear Student,

I am writing to request your permission to undertake a study known as *Instructional Design for Authentic Learning in Multi-User Virtual Environments*. A similar request will be made of all participants. The project is to be conducted by Marija Franetovic, a PhD Candidate at Wayne State University. The general purpose of the study is to investigate your perceptions of virtual learning, virtual team dynamics, and education in the multi-user virtual environments in general.

The research will be conducted by reviewing weekly journals which might take about 5-7 minutes to write and by observing class sessions in *Second Life*. Some students will also be asked if they are interested in completing approximately 3 individual interviews that would last about 15 minutes each. The researcher would sit in for about 3 of the course teams' meetings for up to about 20 minutes each. She would assist by being a sample audience for the team rehearsals and then follow up with a few related questions as part of the course. These meeting follow-up questions also double up as her Focus Group questions. Questions will revolve around your experience of learning and working in a team in the multi-user virtual environment and your overall experience in this environment as it relates to specific content.

All data will be recorded and stored for the study with strict confidentiality, by being labeled numerically and password protected. Pseudonyms will be used for the purpose of transcription and data analysis. Any recordings will be erased immediately after they have been transcribed. If you participate in the interview(s) or focus group(s), you will be given the opportunity to review and comment on the transcription(s). The confidentiality of individuals is completely assured, both while research is in progress and in the final report. Finally, your participation in this research is entirely voluntary. You may participate in any or all of the components. You may decline to respond to any questions or opt out at any time, without prejudice.

If during the research, you should need to consult a resource person other than the researcher, the Chair of the Human Investigation Committee may be contacted at (313) 577-1628. The principal researcher (248-321-4941) is also available to answer any questions related to the study. Thank you for your consideration.

With kindest regards,

Marija Franetovic  
PhD Candidate  
Wayne State University

## A.2 Research Information Sheet

Title of Study: *Instructional Design for Authentic Learning in Multi-User Virtual Environments*

Principal Investigator (PI): Marija Franetovic  
Administrative and Organizational Studies  
(248) 321 - 4941

**Purpose:**

You are being asked to be in a research study of instructional design for multi-user virtual environments because you will be using a multi-user virtual environment in your course. This study is being conducted at Lawrence Technological University by a PhD Candidate from Wayne State University.

**Study Procedures:**

You will be asked whether you are interested in approximately three interviews which would last for about 15 minutes each and Journal entries on weekly topics which should take approximately 5-7 minutes each.

For about 3 of your course team meetings for 20 minutes or less, the researcher will assist by being a guest for your rehearsals and/or ask questions. The types of questions that will be asked in this study will revolve around your perceptions of learning in the virtual learning environment and your thoughts on learning and collaborating in a virtual team. You have the option to not answer some of the questions and to still remain in the study. The study will take place over half a semester.

**Benefits:**

- The possible benefits to you for taking part in this research study are learning about and exposure with performing activities in multi-user virtual environments.
- Additionally, information from this study may benefit other people now or in the future.

**Risks:**

There are no known risks at this time to participation in this study.

**Costs:**

- There will be no costs to you for participation in this research study.

**Compensation:**

You will not be paid for taking part in this study.

**Confidentiality:** You will be identified in the research records by a code number. When the results of this research are published or discussed in conferences, no information will be included



that would reveal your identity. After transcription, data collection and analysis, all data and identifying information will be disposed.

**Voluntary Participation/Withdrawal:** Taking part in this study is voluntary. You are free to not answer any questions or withdraw at any time. Your decision will not change any present or future relationships with Lawrence Technological University or Wayne State University.

**Questions:** If you have any questions about this study, now or in the future, you may contact Marija Franetovic at the following phone number (248) 321 - 4941. If you have questions or concerns about your rights as a research participant, the Chair of the Human Investigation Committee may be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call (313) 577-1628 to ask questions or voice concerns or complaints.

**Participation:** By completing an interview or a journal entry you are agreeing to participate in this study.

## A.3 Human Investigations Committee Approval

**WAYNE STATE  
UNIVERSITY**


HUMAN INVESTIGATION COMMITTEE  
101 East Alexandrine Building  
Detroit, Michigan 48201  
Phone: (313) 577-1628  
FAX: (313) 993-7122  
<http://hic.wayne.edu>




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**NOTICE OF EXPEDITED APPROVAL**

**To:** Marija Franetovic  
Deans Office Business Admin  
22970 Marter

**From:** Ellen Barton, Ph.D.   
Chairperson, Behavioral Institutional Review Board (B3)

**Date:** October 23, 2009

**RE:** HIC #: 107709B3E  
Protocol Title: Instructional Design for Authentic Learning in Multi-User Virtual Environments  
Sponsor:  
Protocol #: 0910007640

**Expiration Date:** October 22, 2010

**Risk Level / Category:** Research not involving greater than minimal risk

---

The above-referenced protocol and items listed below (if applicable) were **APPROVED** following *Expedited Review* (Category 7\*) by the Chairperson/designee for the Wayne State University Behavioral Institutional Review Board (B3) for the period of 10/23/2009 through 10/22/2010. This approval does not replace any departmental or other approvals that may be required.

- Recruitment Email (dated 10/7/09)
  - Information Sheet (dated 10/12/09)
- 

- Federal regulations require that all research be reviewed at least annually. You may receive a "Continuation Renewal Reminder" approximately two months prior to the expiration date; however, it is the Principal Investigator's responsibility to obtain review and continued approval *before* the expiration date. Data collected during a period of lapsed approval is unapproved research and can *never* be reported or published as research data.
- All changes or amendments to the above-referenced protocol require review and approval by the HIC **BEFORE** implementation.
- Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the HIC Policy (<http://www.hic.wayne.edu/hicpol.html>).

**NOTE:**

1. Upon notification of an impending regulatory site visit, hold notification, and/or external audit the HIC office must be contacted immediately.
2. Forms should be downloaded from the HIC website at *each* use.

\*Based on the Expedited Review List, revised November 1998

## APPENDIX B DATA COLLECTION GUIDES

### B.1 Journal Guide

Please indicate this week's topic, the date, and write two short reflection paragraphs.

Paragraph I)

What did you learn about this topic? On a scale of 1-5 (5 being most comfortable), how comfortable are you with this topic and teaching it to someone else? What would you add to this topic that perhaps was not addressed?

Paragraph II)

a) How did you learn this week? (*Did any of the following help you learn – interaction with other students; your team; the instructor; an aspect of the virtual world; resources found in-world, online or other; your own learning strategies, etc.?*) Identify i) what helped and ii) how did it help? b) What could have enhanced this week's class sessions in-world? c) What did you learn about yourself this week in the virtual world environment (may include observations made outside of class)? d) What did you learn about in-world teamwork? What do you think about the progress of your inworld team projects at this time?

Topic		Date	

## B.2 In-Depth Interview Guide

Reflect on the most recent virtual world activity and your overall experience in the virtual world.

- 1) Describe this experience.  
(What did it remind you of?)
- 2) How did you feel about the experience?  
(What was interesting or enriching about the experience? What could have been done to make it a better learning experience for you? What did you learn about yourself in the virtual world?)
- 3) What did you do in your team?  
(Do you feel like you know your team members more or less as a result of the experience? How do you feel now vis-à-vis your team – Different? Same? How?)
- 4) What is one thing you have learned about game development through the experience because it was in the virtual world?  
Please describe.
- 5) Other suggestions or comments you would like to share about the experience of having a virtual identity or learning in a virtual world?  
What helps and what does not?

## B.3 Focus Group Guide

Reflect upon your a) team project deliverables, b) team enactment, and c) team interactions.

- 1) Describe the experience of team collaboration during design.  
(How did you feel about your role and the tasks you completed? About other team members' roles and tasks? How did you feel about the communication process? What did you learn about virtual world teamwork? What is one thing you learned about game design through this experience because it was in the virtual world? Please describe.)
- 2) How did you feel about the enactment rehearsal versus the actual performance?  
(In what way did you relate to your team members prior to and then during the enactment? What is one thing you learned about game design through this experience that you would not have learned in the real-world?)
- 3) What was conducive about the virtual world environment in terms of team collaboration? What wasn't? Why?  
(What helped you learn during this team project and what did not? What about the environment?)

## APPENDIX C PARTICIPANT OBSERVATION FIELD NOTES

Obs\_11.10.09

Pre-Class.

Prior to class, I got to show Nathan how to work with their Inventory as he was one of the few who had expressed an interest in working together. Good thing I met him prior to class and took the opportunity to test the audio. The Instructor's audio was working fine and her and I had a well-scripted plan for the session. All in all, class had a faster start than the previous session had and there seemed to be an increased quantity and quality of interaction in the Chat.

Beginning of Class Session.

There are seats arranged in a semi-circle around a screen that can project a Power Point presentation. Without much questioning, the students encircle the screen similar as they had done in their face-to-face class. They assume almost the same exact positions as they had during their last virtual class. *[RO: I find this slightly peculiar, both the automatic sitting in chairs and choosing the same positions, but I also find it somewhat predictable.*

*I look around the little area where most of us have gathered to attend class and wonder who is really here. And, if they are here – what percentage of them is really here with us?...and by that, I mean on task.]* When I count the students, it seems 14 out of 17 have showed up and there always seems to be a straggler or two who had computer problems getting on or at least that is the reason given. However, to be fair, I do know that this year's laptops aren't exactly optimal for SL graphics technical requirements, so it is understandable that this may occur, especially if they had other applications running. Most of the time they do – either class-related ones or else games they are playing simultaneous to class activities. *[RO: It appears that the laptop technology, which was provided for them to learn, is used the multi-purposed way in their face-to-face classroom sessions...*

Activity 1. Introduction: Assignment Extension and Encouraging Participation

*I'm pleased to see that some have experimented with modifying their avatar.]* It was a major portion of the assignment that was due today and then extended for next class. *[RO: Interesting that some steered towards a visual representation which reflects an idealized self, while others for a self which completely escapes the real self.]*

For this session, the Instructor and I collaborated closely. There was a choreography and an ensuing flow during which students were engaged in a variety of ways:

Session Activity 1. Introduction and Feedback

First, their assignment deadline was extended and students were asked whether they have questions. No one asked questions at this point, however at random times throughout the class session there were posts about it in the Chat. *[RO: I feel that even invitations from the Instructor to help them out may have been construed as too vague for this student group.]*

Next, the Instructor encouraged them to participate in writing of their virtual experience in the Journals and to participate in the class Chat. The feedback seemed to have helped in encouraging them to write more in their Journals for the next time.

Some students seemed to be offering up solutions of what could make class go smoother and having fun with this kind of interaction. About a quarter of the class didn't seem to interact in the chat at all. This subgroups' avatars remained looking like the ones they got as defaults when they started within the virtual world. *[RO: I wonder why it is that some seemed invested in class going well and learning from the experience, while others didn't seem to care one way or the Minority.]*

### Activity 2. Small Group Work

Then, we moved on to a team activity where they were to come up with parts of speech and add them to an ad lib-type story structure. The idea of the activity was to:

Activity Part 2.1 Practice with writing elements for scaffolding towards writing game narratives

Activity Part 2.2 Discuss the different stories which resulted and make the connection that even though they all started from an identical story structure, slight modifications from different team perspectives resulted in markedly different stories

Activity Part 2.3 Students discussed what they did in the activity in terms of building in game choices and levels and their respective payoffs.

It seemed that only one or two of the team members from each of the 4 teams were actually engaged in trying to complete the activity, the rest were passive or providing little meaningful input. A discussion followed about repeatable game storylines and on how in games the player has more control than a viewer has in a movie, and the difference between a flow-chart versus a linear story structure. *[RO: The outcome of the activity overall? The directions didn't come across clearly, so there were mixed results, however parts of it seemed to go over well such as the direction of the discussion. I think it had something to do with the class conversation being encouraged prior and how the Small Group Activity led into the discussion.]*

### Activity 3. Team Work

Finally, students were asked to collaborate in their teams and work on the story writing component of their large design project. *[RO: Again, some confusion.]* However, each group huddled around their designated geometric shape and began to brainstorm the design of their game. *[RO: I think, wow – how lo-fi this set up is, however at the same time – how it works.]* The Instructor and I floated from 1 to 2 teams offering guidance and prompting questions. *[RO: This had a very real feeling. For example, it cannot be compared to prompting a question on the online Discussion Board because it is real time. I felt a real sense of presence as compared to what I feel during a similar activity using a synchronous collaboration tool such as Wimba or Illuminate.]*

**APPENDIX D IN-DEPTH INTERVIEWS**

Participant: Derrick

Team: Purple

Team project milestone: Phase III. Enactment/Reflection

Date: 1.16.2010 (Saturday)

Length of interview: ~ 2 hours (10am-12pm)

Dominant communication media: SL Chat

\*\*\*\*\*



1 [8:03] Asya Pichot: hi  
2 [8:04] Derrick: hi  
3 [8:04] Derrick: how are you?  
4 [8:04] Asya Pichot: k, u?  
5 [8:04] Derrick: heh tired  
6 [8:04] Asya Pichot: totally  
7 [8:04] Derrick: not usually up till one or so  
8 [8:04] Asya Pichot: what up yesterday?  
9 [8:04] Asya Pichot: me too - up till 3  
10 [8:04] Derrick: haha yea  
11 [8:05] Derrick: ummm some girl on my floor's birthday party  
12  
13 [RO: Place and time and format (no voice) for interview]  
14 [8:05] Asya Pichot: want to go somewhere else for interview?  
15 [8:05] Derrick: this is fine for me  
16 [8:05] Asya Pichot: ok  
17 [8:05] Derrick: i need to get out by pretty close to 1130 though if that's ok  
18 [8:05] Asya Pichot: ok  
19 [8:05] Asya Pichot: so I'll try to type fast, but you too, k?  
20 [8:05] Derrick: ok  
21  
22 [R: Comp science (what taking) and art (what taking) background? (check surveys at  
23 beginning)? Yes, if you are doing comp sci degree – it is development, whereas if you  
24 were going to do the art side of things there will be a degree in game design which will  
25 more include 3-D modeling and animation and this will be through the Design  
26 school...curious whether you wanted to double-major?]  
27 [RO: Age/major]  
28 [8:06] Asya Pichot: there are some repeats maybe Age? Major - Is it Computer Science  
29 w/ a concentration in game design or development?  
30 [8:06] Derrick: i'm not sure which it is..  
31 [8:06] Derrick: I've always said it was design  
32 [8:07] Derrick: but i think it's development  
33 [8:07] Derrick: Age -> 18  
34 [8:07] Asya Pichot: ok  
35  
36 [RO: humor]  
37 [8:07] Derrick: and ok. i'll answer them twice haha.  
38 [8:07] Asya Pichot: sorry  
39  
40 [8:07] Asya Pichot: There was this journal format that was posted after everyone did  
41 their game and you (being the A+++ student already did your journals. Though I really  
42 like the way you free-formed yours and I wish more folks did, is there any way you could  
43 just answer the last 2 if I sent them to you --- I feel like I could get a lot of good input  
44 from you.  
45 [8:07] Derrick: if I get some time...  
46 [8:08] Asya Pichot: ok - thanks

47 [8:08] Derrick: I've got some homework over the weekend, particularly philosophy  
48 [8:08] Derrick: but I should have enough time  
49 [8:08] Asya Pichot: want to use voice?  
50 [8:08] Derrick: email them to me  
51 [8:08] Asya Pichot: ah  
52 [8:08] Derrick: \*doesn't have voice\*  
53  
54 [8:08] Asya Pichot: also - There may be other areas in this massive pool of data where I  
55 might not understand something you were saying or be interested if you could briefly  
56 clarify  
57 [8:08] Derrick: Sure  
58  
59 [8:08] Asya Pichot: there is a key to press to turn this off - i forget  
60 [8:09] Derrick: Voice?  
61  
62 [R: *Journal qns (review others that I haven't)*  
63 *(In journal and interview, you say something like it would be necessary to inspire*  
64 *everyone about SL in order to bypass certain attitudes? How so? Isn't the environment*  
65 *inspiring itself? You mean like – saying things like – “Now, we're gonna do this \*fun\**  
66 *assignment.” ....or take them on field trips? What inspired you to do more building than*  
67 *others? Did you check out some of the SL places that had awesome architecture and*  
68 *models? If so, remember which ones?]*  
69 [8:10] Derrick: ok  
70 [8:11] Asya Pichot: SL - Opportunity to get everyone inspired?  
71 [8:11] Asya Pichot: how do you think?  
72 [8:11] Asya Pichot: that is what you said...  
73 [8:11] Derrick: Oh gosh I'm not sure  
74 [RO: Need for inspiration]  
75 [8:11] Derrick: I just think that would be what's necessary  
76  
77 [R: *“nobody felt like there was anything that Second Life was necessary for”? Whereas,*  
78 *the Instructor said that it was a catalyst for understanding game design for at beginning*  
79 *of class – your thoughts?]*  
80 [RO: Attitude toward SL; The rationale for using environment not understood]  
81 \*[8:11] Derrick: The people I knew who complained about it just seemed like they were  
82 because everyone else was complaining about it  
83 [8:12] Asya Pichot: attitude?  
84 [8:12] Asya Pichot: why?  
85 [8:12] Derrick: yeah.  
86 [8:12] Asya Pichot: were there some that didn't possess this attitude?  
87 [8:12] Derrick: Well I think because nobody felt like there was anything that Second  
88 Life was necessary for...  
89 [8:13] Asya Pichot: what differentiated these from the ones that did?  
90  
91 [8:13] Derrick: And I'm sorry to have posted the open-end idea of having something  
92 really creative and inspiring for Second Life without having any specifics

93 [8:13] Derrick: I realize it's a little cliché  
 94 [8:13] Derrick: I'll think about it haha.  
 95 [8:13] Derrick: And yeah I don't think Nathan had a problem with it  
 96 [8:13] Derrick: I only really talked to half the class though  
 97 [RO: Comfort with ambiguity – only small percentage]  
 98 [8:13] Derrick: Well there's some students who are just open ended to about everything  
 99 [8:14] Derrick: Among the class I can think of Zach, Nathan and I  
 100  
 101 [RO: Achievement/driven; even for - character modification]  
 102 [8:14] Asya Pichot: well, why did you modify the avatar you have in this way?  
 103 [8:15] Derrick: I think it was for an assignment...  
 104 [8:15] Derrick: Because I was supposed to look like Y's character for the final...  
 105 [8:15] Asya Pichot: ah  
 106 [8:15] Asya Pichot: I think you got a bit more creative  
 107 [8:15] Derrick: I go for the a.  
 108 [8:15] Derrick: ha.  
 109  
 110 \*[RO: What was learned]  
 111 [8:15] Asya Pichot: What content was covered in the 2nd part?  
 112 [R: Explain to someone else that missed the 2nd half of the course? The first half? If you  
 113 wanted to do a better job, in general what would you do significantly different - how  
 114 would you advertise the course?]  
 115 [8:16] Derrick: We covered story writing/story-telling-in-games in the second half...  
 116 [8:16] Derrick: The structure of a general RPG story  
 117 [8:16] Derrick: and then we wrote one and depicted it w/second life characters  
 118 [8:16] Derrick: and I think a fine job was done  
 119  
 120 [8:16] Asya Pichot: you said in your journal...  
 121 [8:17] Derrick: what did I say in my journal?  
 122 [8:17] Derrick: it's been a while...  
 123 [8:17] Asya Pichot: that it would've been better if it was explained that it would be fun  
 124 [8:17] Asya Pichot: how could you explain to the audience we had that this could be  
 125 fun?  
 126 \*[RO: Framing Assignments as Fun]  
 127 [8:17] Derrick: I remember once writing that I felt more optimistic toward it when you  
 128 said something about one of the assignments being fun  
 129  
 130 [8:17] Asya Pichot: do you think anyone had a bias going into it?  
 131 [8:17] Asya Pichot: oh  
 132 [8:17] Derrick: And I think  
 133 [8:17] Derrick: the last assignment  
 134 \*[RO: More fun if more explicit guidelines were given]  
 135 [8:18] Derrick: would have been more fun if more guidelines were put to it  
 136 [8:18] Asya Pichot: guidelines such as?  
 137 [8:18] Derrick: Like nobody knew for sure that we were supposed to have dialog trees  
 138 [8:18] Derrick: but I think that was an important thing to let everyone know

139  
140 \*[RO: Most people uncomfortable with too open-ended of an assignment]  
141 [8:18] Derrick: I think in general really really open ended assignments aren't something  
142 people look forward too  
143 [8:18] Asya Pichot: well - you didn't necessarily  
144 [8:18] Derrick: even though they should be "you can do WHATEVER you want"  
145  
146 \*[RO: Bias – because undergraduates were not used to this type of classtime]  
147 [8:19] Derrick: and I think a lot of people had the bias going into it that it wasn't just  
148 normal classtime..  
149 [8:19] Asya Pichot: you could have a character that you had bunches of stuff written up  
150 for..and use per situation  
151 [8:19] Asya Pichot: do you think lots of people associated SL with a game?  
152 [8:19] Derrick: Well you could write up a lot for a character, and that's what some  
153 people thought we were supposed to do  
154 [8:20] Asya Pichot: I wish we had had a chance to give you guys examples of how a  
155 finished product would look  
156 \*[RO: Most people wanting specificity on what supposed to do versus research, try,  
157 ask...] [8:20] Derrick: but I think all in all the attitude might have been better if people  
158 knew exactly what we were supposed to do and it was more specific  
159 [8:20] Derrick: yes  
160  
161 [8:20] Asya Pichot: do you think that is because this is a freshman class and everyone  
162 wants directions?  
163 [8:20] Derrick: If you did that  
164 [8:20] Derrick: I think for instance in a video or with a demonstration  
165 \*[RO: Environment conducive to animation, building (decrease text-based assignments,  
166 not including conversation]  
167 [8:21] Derrick: I think it would be important to include a lot of the animation and  
168 building in second life, and less of the text-related things  
169 [8:21] Asya Pichot: but given finished products and examples - ya know what happens to  
170 creativity?  
171 [8:21] Asya Pichot: I agree with you..  
172 \*[8:21] Derrick: like if you showed someone building something that made people think  
173 "I want to build that"  
174 [8:21] Derrick: Yeah I know it diminishes  
175 [8:21] Asya Pichot: and your comment about the demo of bones and such...in your jrn1  
176 [8:22] Derrick: I haven't been past freshman classes, so I'm not sure how the attitudes are  
177 beyond that  
178  
179 [8:22] Derrick: I know there are some students who probably dropped out who were also  
180 pretty negative  
181 [8:23] Asya Pichot: dropped class or participating?  
182  
183 \*[RO: low motivation - not related to SL – retention]

184 [8:24] Derrick: well I mean a lot of the students who were really negative about second  
185 life didn't seem like the type of student that was going to stay at LTU and finish college...  
186 [8:24] Derrick: And I know some of them dropped out  
187  
188 [8:25] Asya Pichot: Extra mile with creating character and game and even building ? I  
189 agree with you...you did: how get others?  
190 [8:25] Asya Pichot: there are/were so many opportunities to script and to animate too ---  
191 just meant a little extra research...  
192 [8:26] Asya Pichot: but, how come not many people are self-motivated like you and a  
193 few others?  
194 [8:26] Asya Pichot: I mean you went the extra mile with a lot of things..  
195 [8:26] Derrick: ehh I'm not sure  
196 [8:26] Asya Pichot: like you're self-directed  
197 [8:27] Asya Pichot: or what they say - internally motivated  
198 [8:27] Derrick: I did a lot of building because we wrote our game in such a way that it  
199 was necessary  
200 [RO: Confusion on certain assignments]  
201 [8:27] Derrick: and we wrote it in that way because we didn't know that there were  
202 dialog trees...  
203 [8:27] Asya Pichot: how do you get folks motivated that don't even get motivated with a  
204 grade?  
205 [8:27] Derrick: then we changed the game to incorporate the dialog trees and it didn't  
206 seem like all the building was necessary  
207 \*[RO: team leader/gamer characteristic - Motivation due to need for/ability toward  
208 creative expression]  
209 [8:27] Derrick: but I did enjoy the building more than anything else...  
210 [8:27] Derrick: And I suppose you could attribute that to a couple things...  
211 [8:28] Asya Pichot: have you tried building together with someone else?  
212 \*[8:28] Derrick: I like designing things... I have a lot of experience designing things  
213 (stories, graphics, 3d models even)  
214 [8:28] Asya Pichot: collaborative building?  
215 [8:28] Derrick: and I didn't have much trouble understanding the 3d modeling process in  
216 second life...so it wasn't as intimidating...  
217 [8:28] Asya Pichot: yes Derrick - your work is exceptional  
218 [8:28] Derrick: ha and I didn't mean THAT...  
219 [8:29] Asya Pichot: got some architecture and design students excited last week to join sl  
220 building/design club  
221 [8:29] Derrick: I'm trying not to brag about myself, but I thought it was an appropriate  
222 answer to the question...  
223 [8:29] Asya Pichot: i wasn't being sarcastic  
224 [8:29] Asya Pichot: I wish more students were like you  
225 [RO: team leader/gamer - ability to take compliments]  
226 [8:29] Derrick: well, thank you  
227  
228 \*Creative Girls, following rules; creative boys, playing with rules  
229 [8:29] Asya Pichot: I wish I was like you when I was your age

230 [8:29] Asya Pichot: I think I followed the rules a bit more  
 231 [8:29] Asya Pichot: do you think that is particular to females?  
 232 [8:30] Derrick: I'm not sure  
 233 [8:30] Asya Pichot: Nathan said something interesting at our last interview  
 234 [8:30] Derrick: I've always thought of girls as the more creative end  
 235  
 236 [8:30] Asya Pichot: he said - boys play more than girls  
 237 [8:30] Derrick: more games?  
 238 \*[RO: female characteristics – not as comfortable with ambiguity of breaking rules]  
 239 [8:30] Derrick: or they toy around with the rules more?  
 240 [8:30] Derrick: probably the latter...  
 241 [8:30] Asya Pichot: well - creative maybe in design and community and look an feel  
 242 [8:30] Derrick: I've never thought about that  
 243 [8:31] Asya Pichot: yes - I believe that's what he was saying  
 244 [8:31] Derrick: But some girls are attracted to guys who do that; I.E. "dangerous guys"  
 245 [8:31] Derrick: so it would only be reasonable to think that it would happen to some  
 246 guys to be like that...  
 247 [8:31] Asya Pichot: more females like Second Life and games like Sims  
 248 [8:31] Asya Pichot: lol  
 249 [8:31] Asya Pichot: that's funny  
 250  
 251 [RO: Need for feedback/recognition for assessment as in games]  
 252 \*[8:32] Derrick: Well, I think a lot of guys/people in general play games because they  
 253 get more credit for it than they do other things...  
 254 [8:32] Derrick: like inside and out of the game  
 255 [8:32] Asya Pichot: like you said in one chat - ya give them guns and they're happy  
 256 \*[RO: motivation to play games related to feedback of achievement]  
 257 [8:32] Derrick: parents praise kids for just about everything and it's easy to get praise in  
 258 a game  
 259 [8:32] Asya Pichot: good pt  
 260 [8:32] Derrick: and then even in games the characters praise the player...  
 261 [8:32] Derrick: and some kids at that age don't get much appreciation for other things so  
 262 they end up liking it...  
 263 [8:32] Derrick: err  
 264 [8:32] Derrick: i guess i went off topic  
 265  
 266 \*[RO: Online – more expressive/talkative than in person]  
 267 [8:32] Asya Pichot: how do you feel about Derrick compared to yourself?  
 268 [8:33] Derrick: i had some idea - differentiation girls and boys in there in general, but I  
 269 forgot it...  
 270 [8:33] Derrick: Ummm...  
 271 [8:33] Derrick: I don't know  
 272 [8:33] Derrick: I would assume I'm more talkative online, but I don't have an unbiased  
 273 way to measure it.  
 274

275 \*[RO: virtual world/chat/IM communication: Speaking more formal versus chatting more  
 276 informal]  
 277 [8:33] Derrick: I probably speak more formally...  
 278 [8:33] Asya Pichot: do you still think others are more talkative?  
 279 [8:33] Derrick: and in complete sentences  
 280  
 281 \*[RO: Participation increases online, especially when relevance]  
 282 [8:34] Derrick: Well, I think when an opportunity comes up where they want to speak  
 283 [8:34] Derrick: I.E. about a game  
 284 [8:34] Derrick: more people jump on the opportunity to speak when they're online  
 285  
 286 [8:38] Asya Pichot: do you think that our class in particular had a hard time with  
 287 expression?  
 288 [8:38] Derrick: I promise I'm being as descriptive as I can ;)  
 289 [8:38] Derrick: haha.  
 290 [8:38] Derrick: expression of what?  
 291 [8:38] Asya Pichot: self  
 292 [8:38] Asya Pichot: feelings  
 293 [8:38] Asya Pichot: desires  
 294 [8:38] Asya Pichot: hopes  
 295 [8:38] Derrick: you mean with their opinions about things?  
 296 [8:38] Asya Pichot: dreams  
 297 [8:39] Asya Pichot: themselves  
 298 [8:39] Asya Pichot: yes  
 299 [8:39] Asya Pichot: opinions  
 300 [8:39] Derrick: Well, I don't know how they spoke to you guys  
 301 [8:39] Derrick: I'm assuming it was pretty negative  
 302 [8:39] Asya Pichot: that looks like onions  
 303 [8:39] Derrick: In my Red team focus group with you, the other team member seemed  
 304 like he was pretty willing to tell you everything he thought...  
 305 [8:39] Derrick: but, everything else I heard about the class  
 306 [8:39] Derrick: was spoken friend - friend  
 307 [8:39] Asya Pichot: Learn anything about yourself taking over friends from class?  
 308 [RO: some authenticity lost due to nature of research]  
 309 \*[8:40] Derrick: there was less of a formal barrier... they didn't seem to have a problem  
 310 "expressing" themselves to me...  
 311  
 312 [8:40] Asya Pichot: I mean....  
 313 [8:40] Derrick: what do you mean?  
 314 [8:40] Asya Pichot: sorry  
 315 [8:40] Derrick: "taking over friends from class"  
 316 [8:40] Derrick: like is there a typo?  
 317 [8:40] Asya Pichot: 2 qns ran into each other  
 318 [8:40] Asya Pichot: I'm trying to hurry  
 319 [8:40] Derrick: haha  
 320 [8:40] Asya Pichot: not a fast typer

321 [8:40] Asya Pichot: like you  
322 [RO: Immediacy of chat versus the time allotment for asynchronous – depends on what  
323 type of question and objective(s)]  
324 [8:40] Derrick: well, if you need to you can just email me questions...  
325 [8:41] Asya Pichot: ok..  
326 [8:41] Derrick: I'll probably answer them more thoroughly and completely..  
327 [8:41] Derrick: I don't really understand why interviews are done in real-time  
328 [8:41] Derrick: \*just in general\*  
329 [8:41] Asya Pichot: but I'm sorta after your real-time responses here  
330 [8:41] Derrick: oh ok  
331 [8:41] Asya Pichot: ya know what I mean?  
332 [8:41] Derrick: Well yeah  
333 [8:41] Asya Pichot: ok  
334 [8:41] Asya Pichot: so  
335 [8:41] Derrick: but sometimes, I don't feel like that captures exactly what I thought about  
336 something  
337 [8:41] Derrick: like maybe if you were to ask "do you like the class"  
338 [8:42] Asya Pichot: how many of these friends were from class if you don't mind  
339 [8:42] Derrick: that would be a good gut response to have in my opinion  
340 [8:42] Derrick: but when you say like "why are some students more positive about the  
341 class while some are negative"  
342 [8:42] Derrick: I think that should be something more thought about  
343 [8:42] Derrick: when you say "these friends" which friends are you asking about?  
344 [8:42] Derrick: Friends that had no problem talking about classes?  
345 [8:42] Derrick: none of my friends had problems talking about classes...  
346  
347 [8:42] Asya Pichot: the friends that confided in you how stupid the whole sl thing was or  
348 something like that  
349 [RO: all right feedback from team leader/gamer who was engaged with approximately  
350 half the class]  
351 [8:42] Derrick: and not all of them were negative about it if that's what you're trying to  
352 get at  
353 [8:43] Derrick: sorry, I might have been a little unclear about that  
354 [8:43] Derrick: There's the students who are really unbiased to everything  
355 [8:43] Derrick: and I think that makes up the bulk of college students (but I wouldn't be  
356 the one to speak about that)  
357 [8:43] Derrick: and those didn't seem to dislike the class  
358 \*[RO: Low motivation or Biased students]  
359 [8:44] Derrick: but, then there are the students who like to blame their grade and  
360 boredom in classes on whatever they can put to blame  
361 [8:44] Derrick: and those were the ones who didn't like it  
362 [8:44] Derrick: And I don't remember how many didn't like it, sorry....  
363 [8:44] Derrick: I could give you a number, but it wouldn't be anywhere near accurate -  
364 even for an idea- at this point



365 [8:45] Asya Pichot: I was of the opinion that 5 were like very engaged, 5 were sorta  
366 engaged, 4 were like –marginally engaged, and maybe 4 had very little  
367 engagement...what's your assessment?  
368 [8:45] Derrick: you mean in the whole class?  
369 [8:45] Asya Pichot: yes  
370 [8:45] Derrick: Ehh  
371 \*[8:46] Derrick: I only really talked to those in my Purple team and the Blue team and  
372 then a couple in the Purple team and one in the White team...  
373 [8:46] Asya Pichot: thank you  
374 [8:46] Asya Pichot: see ya later  
375 [8:46] Derrick: Cya  
376 [8:46] Derrick: Good luck  
377 [8:47] Asya Pichot: :)  
378 [8:47] Derrick: Heh nah i'll be just on time  
379 [8:47] Derrick is Offline

## APPENDIX E FOCUS GROUPS

Focus Group: Red Team

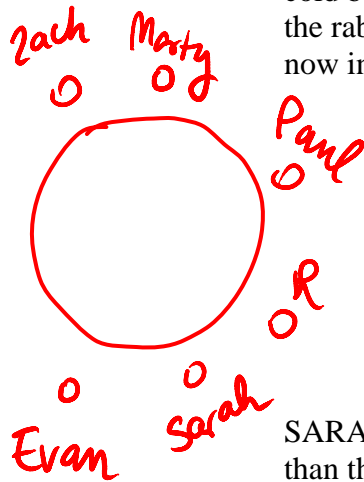
Team project milestone: Phase II. Development

R: Researcher; 5 Red Team Members: Zach, Marty, Paul, Sarah, Evan

Voice Descriptions and Brief Introductions to Members of the Red Team:

ZACH [RO: talks the most, slightly more feminine voice compared to the other 3 young males; the intonation appears fun, motivated, and confident (though not in a snarky way)]

MARTY [RO: slightly muffled and deeper voice; sounds like he has a cold but it is his voice; in the beginning, he exclaims: "my character was the rabbit person..."]; had played Fable II, Final Fantasy and WOW, but now into Modern Warfare II.



PAUL [RO: deeper voice with an edge to it; says the least; appears shy; in the beginning, he shares that he played Mass Effect for a while, but moved on to other games.]

Researcher

SARAH [RO: the only female in class other than researcher, slightly older than the others; has played Sims and Pokeman but not actively playing games lately; doesn't say much; appears to like to share and explore]

EVAN [RO: deeper, full-bodied matter-of-fact voice; in the beginning, he talks about having played: "WOW, Fable, Fallout 3, and Mass Effect, however appears to be an active gamer in Modern Warfare II"]

1 R: So, if you don't mind, not that it bothers me, but like the lap tops, if we could just put  
2 them away, and we can go back to them. And then when we are doing this thing going  
3 around, like if we could take turns.

4 R: So where do you guys feel like you are at with the thing for tomorrow? Anyone like  
5 to start?

6 ZACH: Kind of, like, we got most of it, but we are kind of not ready to because when  
7 you said yesterday with the dialogue and stuff, we never really made up any dialogue for  
8 our character. I mean now, that you were telling us yesterday and you said that animals  
9 would talk, we don't have any dialogue that we are going to, like if someone asks if the  
10 animals something, I don't know what. We didn't know that that was going to happen  
11 eventually, like when we made the game, I thought we were just for an idea for a game. I  
12 didn't know that we had to have dialogue for everything, I mean that is characteristic of  
13 an RPG game but I guess I didn't think of that, and that is what we are going to have to  
14 do. We don't have any dialogue for the animals or anything so far.

15 R: Well, we can get some ideas going. Do you guys all want to take out a piece of paper  
16 so that while we are doing this, we could start with some ideas? Like for example think  
17 about your character, like you have your NPC or whoever your character is. Think about  
18 some things like the type of character that he is or she is or whatever, and some things  
19 that he or she might say that is characteristic of him or her. So if this is somebody who is  
20 not going to let whoever find the cure, the player find the cure, like how would they trick  
21 them. Like I was thinking if Sarah's character is like, "Hey the cure is that apple over  
22 there," and then, you know, the players may be tricked to going over to the apple thing  
23 that is turning, but that is not the Flintstones or whatever.

24 PAUL: Or aren't we animals though, so can we not really talk? Because there is only a  
25 player, like the main character and then there is the one bad doctor. Those are the only  
26 two humans.

27 [RO: interesting that not really thinking outside the box here.]

28 SARAH: Or we can put it in "chat" or say something for the gestures that they have.

29 R: That's a good idea. Like have any of you explored the animations in there?

30 MARTY: A little bit.

31 [RO: Just some of them exploring.]

32 R: I think it would be a good idea if they talk, I mean I don't want to be pushing you  
33 guys, but since it is.....

34 ZACH: Like talking animals or?

35 SARAH: Well, I got talking animals, I said talking gestures.

36 R: You mean in the chat.

37 PAUL: Yeah.

38 R: So that they would have things that they would say that are characteristic, I mean like  
39 what you guys did for the character assignment. Umm, to kind of have an idea of what  
40 this dude is like or whatever.

41 PAUL: Yeah.

42 R: So just write down what you think your character would say. Do you want a piece of  
43 paper?

44 MARTY: I don't even have a pencil.

45 R: Oh, I'll hook you up. Now just start going at it...a couple of ideas. It shouldn't be  
46 that hard.

47 ZACH: Sure.  
48 (Long hesitation.)  
49 R: Now what is your second life name?  
50 EVAN: Evan.  
51 R: Oh, okay, and you are real?  
52 EVAN: \_\_\_\_\_  
53 R: And you are PAUL, right?  
54 PAUL: Yeah.  
55 R: Yes, I got ya. (whispered)  
56 R: So as soon as you have something, go ahead and share.  
57 (Long hesitation.)  
58 R: Marty, you want to start us off?  
59 MARTY: My character was the rabbit person, so I was just thinking that he would talk,  
60 and since he is a person/rabbit, he probably escaped from Dr. Crosby's mansion and he  
61 would be like a good character and help Peter, like defeat Dr. Crosby? I don't know what  
62 kind of dialogue you would have though.  
63 R: Have any of you guys played many RPG games? I don't know...what RPG games  
64 have you played?  
65 MARTY: I just played Fable II.  
66 R: So what RPGs have you played?  
67 ZACH: Final Fantasy and WOW.  
68 R: Okay. How many years for each?  
69 MARTY: Oh, I played WOW, like maybe 2-1/2 or 3.  
70 R: I'll just put a year. Paul?  
71 PAUL: I played Mass Effect pretty much.  
72 R: Mass Effect?  
73 PAUL: Yeah.  
74 R: Is that like an RPG too or?  
75 PAUL: Yeah.  
76 PAUL: It's for the X-Box. I don't know, I think it's for the P.C.  
77 R: How long did you play that?  
78 PAUL: Probably not even half a year, but that's because I don't really stick to a game  
79 very long.  
80 R: Sarah?  
81 SARAH: Umm, I just played regular Sims.  
82 R: Oh, okay.  
83 SARAH: \_\_\_\_\_ (laughs)  
84 R: You didn't do a thing where they like starve them to death, did you? Because our  
85 game design speaker said that all these people did was like starve to death their  
86 characters.  
87 SARAH: No, I burned the house down and anti-social.  
88 R: (Laugh) Okay.  
89 R: Evan?  
90 EVAN: Oh, I played WOW for a few years and then X-Box - like Fable games, Fallout 3,  
91 Mass Effect and stuff.

92 R: Okay, so someone is going to be like my, what you call those guys, like guides, and  
93 I'll call you up.  
94 R: Sweet! Okay.  
95 MARTY: I played WOW for a few years too.  
96 R: Now, do you guys mind that I'm calling you by your second life names? Like are you  
97 starting to feel like you are that person in there when you're in there?  
98 Everyone - No (laughs).  
99 R: Does anybody?  
100 SARAH: No, but I've played for hours, like in a trans.  
101 EVAN: I only log on for a while. After a while, I just don't want to play games a lot.  
102 SARAH: I go places.  
103 R: Yeah, Sarah says she spends a lot of time.  
104 ZACH: Yeah, I spend a lot of time and I used to spend a lot of time on it, so it's like I'm  
105 not spending a lot of time with video games anymore.  
106 R: So the WOW thing for most of you, it was a thing of the past or you let it go.  
107 ZACH: Yeah, for me.  
108 MARTY: I'm still playing, well no, since Modern Warfare 2, I haven't played it.  
109 R: I am so behind. But you know what, I'm just going to put this out there. I never said  
110 that I was a gamer, which is why we are doing this research in this class, because you  
111 guys are like experts, my experts. What is this one called, but this one is not RPG, its  
112 Modern Warfare.  
113 MARTY: It has some shooting in it. [R: He smiles.]  
114 [RO: Referring to SL as game.]  
115 R: So, you guys mentioned some things that caught my ear. The second life game, I  
116 don't think of it as a game. So why do you think it's a game? I mean it's okay, if you  
117 think it's a game.  
118 EVAN: I don't really think of it as a game. I think it more like virtual real, social thing.  
119 ZACH: I don't know I just call it a game because it is interesting.  
120 SARAH: Cartoon-like.  
121 R: Yeah, it's long, right? They should come up with something, like I don't know,  
122 whatever...VW. That sounds good. Like they have VR, VW.  
123 [RO: Cannot listen to just lecture...other distractions...want to do things]  
124 EVAN: Hey, it's cool but it's like more efficient to get things done, because people go  
125 away or they go get a sandwich. Like I find myself going to the bathroom a lot more, like  
126 "I'm going to the bathroom" or something because I can't just sit there for, like listening  
127 to a lecture for a whole hour or like sitting in front of a computer. It is easier when  
128 everybody is there to get something done.  
129 Yeah, it's more tempting than doing other stuff, like to play games.  
130 R: Do you think it has something to do with, like what you just said listening to a lecture  
131 and if it was like "Okay folks, you're doing more of those activities like we did those  
132 interviews." Remember when we did that? So it's like you've got to be doing it now,  
133 because it's not like you could go off to lunch.  
134 EVAN: Yeah, like a lecture, especially if someone is transcribing it so you can go away  
135 for ten minutes and come back and read real quite and then you could get caught up  
136 again. I'm not saying I've done that.  
137 [RO: CATS and participation points]

138 R: But then also if there were some things in there, like some rules that you have to  
 139 participate or something? What if there were some rules that you have to participate like  
 140 if the instructor calls on you, you have to participate within a second? It's got to be the  
 141 same timer. And then it would be like "well you weren't there, points off." Could that  
 142 be an idea?

143 ZACH: Yeah, that would get people to pay attention more. I mean, a lot of people are  
 144 interested and I pay attention and participate sometimes, but I'm not like on every  
 145 question answering and stuff like that.

146 R: So in that journal, the last journal format, there was a question on how do we get you  
 147 to participate more. I think some people took it as if it meant like "I participated in it."

148 SARAH: I'm there, I just didn't know what to write.

149 [RO: could get interaction through activities like interview, group activities, guests,  
 150 Socratic questioning]

151 R: Like in a place like that, how do you get more people to participate?

152 MARTY: More interaction.

153 R: Like what?

154 EVAN: not just sitting in a chair listening to someone talk. [RO: said with a tone of  
 155 sarcasm.]

156 R: Well how do you do the more interaction thing?

157 ZACH: I think the interview thing is pretty cool except no one that showed up. But it  
 158 was alright. It was fun. I kind of like going, even though it sounds weird, I like going to  
 159 your class a little better. It's just easier to get everything done and set down. I feel like  
 160 I'm always worrying whether we are going to get stuff done or not by the due date and  
 161 whether everybody has what they need and stuff like that.

162 R: So Marty, it looked like you were going to say something too, about we were saying,  
 163 like interaction, how you could get more interaction

164 MARTY: Like divide into groups, I think, works well, just like something to do, and then  
 165 divide into groups they getting stuff done like that, like of everyone in the same area.

166 R: What did you think about that one time when we had the four facilitators?

167 MARTY: That worked well too because you would have to explain everything to each  
 168 one and then we would get new ideas off it.

169 R: Who did you guys have?

170 Everyone - Chase.

171 ZACH: He kept going off on somewhere else. We didn't get a lot off him. But the other  
 172 girl, Kim. She was helpful.

173 R: How was she helpful?

174 MARTY: She just had us re-explain our game and bounce a few ideas off us.

175 ZACH: Yeah we kept getting more and more ideas.

176 R: She loved talking to you guys, because I talked to her afterwards. She said, "They  
 177 have a real cool game and it's this and this." And I said, "I've read it already. (laugh)

178 R: So what did she have you do?

179 EVAN: She just had us re-explain our game and we tried to find new ideas and she would  
 180 bounce ideas off us too, all the things that we could add to our game.

181 R: Like I thought one cool thing would have been, like if we had also for example the  
 182 guy that came and talked about games as art, like in real life, like if we had somebody

183 who does designs for second life type environments to come in, and each group could  
184 interview him or something like that. Evan?  
185 EVAN: Yeah.  
186 (Everyone laughs.)  
187 R: Like what is an activity that you think, think of one that you would think would be  
188 good.  
189 EVAN: I don't know just like more questions and answers.  
190 R: Questions like what. Like what is the meaning of the story?  
191 EVAN: I guess you could say that and have him go around ask random people. Or  
192 questions about like he has a lecture and then throughout he will ask people from what he  
193 said and what they think about what he said.  
194 R: Oh you mean he did that in the face-to-face, kept asking? Did a lot of people  
195 participate?  
196 ZACH: Well, I think everybody kind of built off each other. I think one person  
197 participated and then someone else would raise their hands. So one person would  
198 \_\_\_\_\_ and then everybody else would get more comfortable.  
199 R: So you think that was more of a discussion type setting?  
200 ZACH: I like discussions better than the lecture. I like discussions a lot.  
201 R: What you are saying is something totally different from what another team said.  
202 ZACH: What did they say?  
203 R: They said that pretty much...I thought what they were saying is there is pretty much  
204 the same interaction like in class and in world like we are doing, like the same people are  
205 participating more.  
206 [RO: engagement when relevant examples and discussion.]  
207 ZACH: I guess. Depending on the day or depending on the lecture actually. If it is  
208 things like marketing or gains and stuff, everyone stays pretty quiet. But when actually  
209 getting into talking about different games, like examples from games, and then everyone  
210 started naming off games and talking about them, but depending on the lecture, really,  
211 like whether it was a dry subject or if it was actually interesting.  
212 [RO: learning from games: how could quests, rewards, leader boards, forums for faqs be  
213 incorporated into learning?]  
214 R: So I hope you guys don't mind, I'm going to be picking on you. So let's just say you  
215 are playing one of those games, so what is something that is fun to do in one of those  
216 RPG games.  
217 MARTY: Quests and rewards.  
218 R: Like, what is a reward?  
219 MARTY: Like you do a quest you get paid or you get experience or something, get some  
220 kind of an item.  
221 R: Do you get an item? Do they tell you, like, that you are doing better than so many  
222 people?  
223 MARTY: Oh yeah, leader boards.  
224 R: Do any of you guys keep up with things that are on online. I don't know what they are  
225 called, like the boards where they.....  
226 PAUL: Forums?  
227 R: Yeah, forums....what's new. Who does that?  
228 ZACH: I used to.

229 SARAH: Yeah, we all did that . I don't write on it but I read a lot.  
230 R: That's cool. So what did you get out of it when you did it?  
231 EVAN: Not that much, because most people felt like going to other forums than I went  
232 on. But just like fool around with it, started stupid topics.  
233 ZACH: It's mostly for entertainment. Most forums are for entertainment.  
234 R: But don't you learn some stuff, like here are a few tips? Like there is this game that I  
235 am playing right now and I need to get out of the funk where I'm at right now.  
236 EVAN: You can find them and then you can ask for help and stuff and tips. And then  
237 people will reply.  
238 ZACH: But then are also forums that are just all topic or general and people just playing.  
239 It is mostly for entertainment. More people go on it for entertainment than for tips and  
240 stuff. But like if you need help? You can ask but you're sure that another person has  
241 already asked. You can just search that out and see if anybody else has already asked it.  
242 R: Has anybody ever played Spore or tried it?  
243 ZACH: I've tried it.  
244 R: So what it's like being a creator?  
245 MARTY: I just like other features - I never really played the game.  
246 [RO: why play RPG games – for the feeling of accomplishment, for the campaign – main  
247 story]  
248 R: So why would somebody play RPG games versus, for example, Modern Warfare?  
249 EVAN: Time consuming.  
250 R: Waste time, you mean?  
251 ZACH: Yeah, like accomplishment.  
252 EVAN: Oh yeah accomplishment.  
253 ZACH: When you go through it and you get rewarded and you keep getting better and  
254 better and better. You just feel accomplished.  
255 EVAN: Or more like character interactment in the video game characters and story.  
256 Because I think Modern Warfare, more people play it for the multiplayer.  
257 PAUL: Yeah and for the campaign.  
258 R: What does that mean, folks? for the campaign?  
259 EVAN: Well, like the main story of the video game.  
260 ZACH: There is a story for the game and then there is multiplayer, you can play online  
261 with everybody. No one really buys it just to play the campaign. Everyone plays online.  
262 It's really popular.  
263 R: I see, so to play it like online.  
264 R: What about like Halo, or whatever?  
265 ZACH: The same thing.  
266 R: It is just like mostly shooting?  
267 EVAN: Yeah.  
268 R: So that is what struck me about your game a little bit. I'm like, "Okay so where is the  
269 interaction?" Flintstones?  
270 SARAH: Yeah.  
271 R: So you want to come back to the original question, like we've got this tall rabbit and  
272 he says uhmm something.  
273 MARTY: Like, I don't know, maybe he goes...  
274 R: Pleads for help. "Hey, Peter, wow," you know?



275 MARTY: Or he would help Peter in this. Like....  
276 R: Give him a clue?  
277 MARTY: Yeah, like that person, I don't know, like the maid in Dr. Crosby's mansion,  
278 and then he would escape somehow. Like he gives him tips.  
279 R: What is the tip that he would give him?  
280 MARTY: I don't know, like secrets or whatever about the mansion.  
281 R: Well, what is a clue that he could give him? Like about the vitamins. Because he is  
282 still trying to figure out what it is or not? Is that what Peter is trying to do, figure out  
283 what the cure is?  
284 ZACH: He is trying to get to Dr. Crosby. He already knows about the Flintstone  
285 vitamins. He is trying to Dr. Crosby's mansion and stop him.  
286 MARTY: Dr. Crosby is like trying to take over.  
287 R: Okay, so do you think that if we added complexity to it, perhaps that, umm, lets say if  
288 he answers a question that you ask him or something, that you give him so many  
289 vitamins, and then he can progress to the next level or something and ask, umm...Paul?  
290 (Everyone laughs)  
291 R: How do you make it a quest? I mean, how do you...  
292 MARTY: Oh, like the interaction with the rabbit, possible.....  
293 R: Tall rabbit?  
294 MARTY: I don't know like...  
295 R: Like I'm Peter, okay, "Hi, umm, hi." Where is this guy? Like time is running out, the  
296 world is....  
297 MARTY: Yeah, I really don't know like how. Like if a tall rabbit person tells a story.  
298 R: Did they mix you with a human?  
299 MARTY: Ah, yeah.  
300 R: They did?  
301 EVAN: Yeah.  
302 R: Okay, well how about tapping into those faculties (laugh).  
303 EVAN: Maybe you should start out by telling Peter what happened. You can tell him  
304 how to get to the mansion or something.  
305 ZACH: Yeah, and you could make it into a quest, you could like "you need the cure, five  
306 animals to talk to him. You need 0 to talk to him, 5 to talk to him, 10 to talk to her, and  
307 they give you more and more and then you can find the mansion."  
308 R: Tomorrow, folks, like you guys need to agree on this segment, like how many to talk  
309 to who and to what. Yep. I'm not trying to like raise the level of intensity here, but I am.  
310 (laugh). Is anybody nervous?  
311 ZACH: Yes.  
312 ZACH: I don't know how to make the trees and stuff for like and the mansion, and I  
313 don't know how to show that where we need to cure 5 animals? Well, we don't have "5"  
314 animals.  
315 R: Woah, wait, like we can just answers those questions like right away now. What was  
316 the first one?  
317 ZACH: We don't have a tree.  
318 R: A tree, okay, we have it. That's just like one click. We'll do that. Okay, what was the  
319 other one? We don't have enough animals. Who are the animals, just raise your hand.  
320 (Pause)

321 R: Four animals.  
322 ZACH: Well we don't have enough, like say we need the cure. Five to talk. We don't  
323 have five animals other animals. That would be like in the other story or whatever; or it  
324 would be not up to that point.  
325 R: Or it could be like you need to find the tall legged rabbit and cure him first.  
326 EVAN: Yeah, like you could have little objects in the game that like.....  
327 R: .....that looks like the rabbits. Yeah, we put in a picture of the rabbits. Okay, so we  
328 we'll have a picture of some animals. Anybody draw a picture of some animals to cure?  
329 MARTY: I can't draw.  
330 R: Dude, it was your idea....  
331 (Everybody laughs)  
332 [RO: collaboratively brainstorming for their RPG game]  
333 SARAH: Just draw a stick person.  
334 R: They can be stick animals. The point is interaction, like they can get to do it.  
335 EVAN: Now?  
336 R: Well, now is fine. But...  
337 PAUL: or you can go on Google.  
338 R: Perfect, click together, or can you collage them together?  
339 MARTY: Sure.  
340 R: Alright. That's your thingy there. So he has 5 animals smushed together.  
341 ZACH: Now, how do we represent them being cured?  
342 SARAH: We change them into people again or change them into non-mean animals.  
343 MARTY: Like being ravaged, and then change the pictures for like regular?  
344 ZACH: Can we do that?  
345 MARTY: Yeah, treat an object in the world and then have it set to an image and then  
346 after you, say you cure it, just change the image to a regular animal.  
347 ZACH: See, I don't know how to do any of this stuff.  
348 R: Well, that is why you guys need to talk, so you are going to do what?  
349 EVAN: I'll make like five objects and put pictures of animals that look like they are sick  
350 and ravaged and then find the same animals but they are just like regular animals and  
351 stuff.  
352 SARAH: They are smiling and waving?  
353 EVAN: And then we have cured them, they can just change them.  
354 R: Okay, to make this easier for yourself, I would just make one. I would make a version  
355 1 and version 2, and then just be able to copy them. What do you think about this object  
356 oriented...See I know something about it. (laugh) And I think it costs to put up  
357 textures....or do you have something that you already have that you put up.  
358 EVAN: I don't know. Can't you just upload pictures, or do you have to...  
359 R: Yeah, you got to put in some cost thing.  
360 SARAH: I don't have anything.  
361 R: Well figure out the pictures so you might want to send me the pictures.  
362 EVAN: There are places there that you can go and get like an object that looks like an  
363 animal. Well, not like one you can change yourself, but like one you can put "tree A"  
364 and stuff. Like how someone traded a vehicle or whatever. They got it from the store,  
365 and they traded and then they drive around. Can you go find something like that?

366 R: Yeah, I posted it saying on line too “I’m searching for stuff.” Have you looked at  
367 that? A lot of you are wondering how you search for stuff, but if you look at YouTube, it  
368 is a really a short video and it gives you an idea how to search for stuff. Okay, so that’s  
369 something, so you’re taking that one up. There is a really cool thing, there is a stage 1  
370 where they are messed up and then there is a stage 2 where they change into it.  
371 ZACH: Yeah, you can be the 0, so you don’t need any cured animals to talk to you.  
372 Yeah, you said they cure you. Then you can be what, 3, 5 and 7?  
373 R: What does that mean, now? Zero?  
374 MARTY: 3, 5.  
375 ZACH: ...and 7 animals. Well basically, 1 because you need to talk to him and then you  
376 can talk him. So he would be like 1 plus \_\_\_\_\_. He is already 1, then he need 3 to talk to  
377 him, 5 to talk to her, 7 to talk to her. Sorry, I didn’t mean to call you over. Then they can  
378 all give information on where or what Dr. Crosby is doing.  
379 [RO: learning from games fro ID: backstory – introduction, rules – requirements,  
380 challenges – criteria]  
381 R: Now are you Dr. Crosby?  
382 ZACH: I am. (laugh)  
383 R: Can you make a cameo appearance and be like “ha, ha, ha, ha, ha.” Are you going to  
384 do something that is going to scare them away?  
385 ZACH: Didn’t you have a suite the other day?  
386 EVAN: Yeah had a suite.  
387 R: One of the rules we talked about was “don’t scare the animals.” But another one that  
388 just came to me would be also like if you are this far away doctor, he can take away  
389 something.  
390 MARTY: He could take away our vitamins.  
391 R: He could take away our vitamins. Stay away from him. Don’t answer his questions.  
392 So you can come up ask the player questions, but if they didn’t read the rules, the rules  
393 said if you answer his questions, he takes away one vitamin.  
394 MARTY: Don’t hide behind a tree?  
395 ZACH: Yeah, you get so many vitamins to start with, 10? You get 10 to start with, I  
396 guess, and then that leaves 3 that they take away. And you can still get to the mansion,  
397 even if you get 3 taken away.  
398 R: So we’re starting off, I’m the player, “Hey, whatzup? What happen to you?” Would I  
399 even know to say “What’s happened to you?”  
400 MARTY: Oh no....  
401 R: Is your backstory all done up and ready, like it says where we are in the segment?  
402 Who can do that. Volunteer?  
403 MARTY: Oh, I guess I could do that.  
404 R: You might want to test yourselves out.  
405 MARTY: Well, I am just a rabbit, though, so.  
406 EVAN: Be a dog.  
407 R: Can you make a dog? Get a dog?  
408 MARTY: I guess, if we have a dog.  
409 EVAN: We have a communal bear too, don’t we?  
410 R: Well, can you make him so that it is demented looking?  
411 SARAH: There are gummy bears, that is what the other bears were.

412 MARTY: I don't know how to change the avatars.  
413 [RO: Here we go, he still hasn't modified his avatar once and we had session activities  
414 and an entire assignment to do so.]  
415 SARAH: You just wear it as clothing.  
416 MARTY: Yeah, but I don't know how to change it so it is demented looking or  
417 something.  
418 SARAH: Just mix him up.  
419 MARTY: I guess.  
420 R: Well if you are wearing it, you can still change the appearance thing, right.  
421 SARAH: Yeah.  
422 R: You know how to do the appearance thing, right?  
423 SARAH: Just make sure it is saved somewhere else because you don't want to mess up  
424 the original figure.  
425 R: So you are the dog and you're going to mix it up and then explain what happened to  
426 you.  
427 MARTY: Yeah.  
428 R "So why am I playing this, this is so boring?" What are you going to say to me that is  
429 going to make my day? Like make it a time thing. Say, "well we've got 5 minutes."  
430 ZACH: "You've got 5 minutes, you need to cure 2 more animals."  
431 SARAH: 5 minutes to save the world?  
432 R: Did you write all this stuff that we have for you, like how you are coming in. I'm not  
433 going to know. You are transferring the backstory and the rules.  
434 ZACH: I'm going to make it so that you're not suppose to answer my questions or I'll  
435 take a pill away. And you have to tell them that they only have 10 pills.  
436 R: Put that in the rules.  
437 ZACH: Oh I'll put them in the rules.  
438 R: So you transfer the rules, you transfer the backstory, your writing the backstory and  
439 you're putting it on the discussion board.  
440 MARTY: Do they have to cure me before I know I can talk.  
441 PAUL: Yeah.  
442 MARTY: Okay, so I should talk like a rabbit, I guess?  
443 SARAH: "What's up doc?"  
444 (everyone laughs)  
445 R: That would be great, throw it in there. I mean a little humor.  
446 SARAH: Because he is a doctor.  
447 R: Peter is a doctor?  
448 EVAN: Yeah. He is a good doctor.  
449 R: Has anyone seen the movie *Nine*?  
450 MARTY: No.  
451 R: It's yummy. Gummy yummy (laugh). I'm sorry. Anyone see *Up*?  
452 MARTY: Yeah, I did.  
453 R: Anybody like it?  
454 MARTY: It was cute.  
455 R: So you are going to have like 5 minutes.  
456 MARTY: Yeah, a certain amount of time to cure a certain amount of animals.  
457 R: Now is this one going to be hidden? This next animal.

458 MARTY: Yeah.  
459 R: You want to give me a clue?  
460 MARTY: Yeah, you'll get a clue.  
461 ZACH: I'll put it in the rules that you have to talk to all the animals before you can go to  
462 the mansion or you can tell them where it is or whatever.  
463 R: So that is at the end?  
464 ZACH: Yeah. He's the last animal.  
465 R: But what do you think for example....I'm just throwing this out there, it's your  
466 game.... What if she was hidden in a cave, like we are creating cave.... So you say to  
467 me, "It's a riddle, its where the bear sleeps." She's being the bear. And I'm looking  
468 around...there's the tree, there's the cave. I'm not making it tough. What do you think?  
469 EVAN: Yeah, we can do that.  
470 MARTY: Each animal tells where the next animal is.  
471 EVAN: Or "cure 2 more animals and I will tell you where the next animal is."  
472 R: Can you make your dog look like a wolf?  
473 MARTY: I don't know.  
474 SARAH: I didn't find any wolf things.  
475 R: How about a dog house? I mean it would be so easy to create a dog house.  
476 ZACH: Yeah, well we need a dog house or a bear cave.  
477 EVAN: I'll just be there.  
478 MARTY: You can be at the end.  
479 PAUL: And then you, what are you?  
480 ZACH: Well, it needs to be besides a dog a bunny or a bear.  
481 SARAH: I have butterfly wings on me.  
482 ZACH: That's cute.  
483 R: Oh, or would it be you're just information, like, "He just started on me, and he is  
484 going to make me into the pterodactyl .....his latest thing"...he is going to be mixing  
485 dinosaurs as well now.  
486 SARAH: I've got angel wings. I haven't found any lizard things.  
487 R: Like whatever you are and with the wings, and your like "Oh no, he's going to start  
488 with me next" you know?  
489 ZACH: You need to give him wings. Either that or he'll be a flying bunny.  
490 R: The bear with the wings?  
491 MARTY: Or I can try to find something else.  
492 R: All right, where are we now. Hey, so I'm all the way over here and we have 15  
493 minutes into this game remember folks, so where is this guy hiding?  
494 SARAH: I don't know. He can't fly, right?  
495 R: Are you going to tell me what happened to you or do I need to know, or? Do you  
496 want to tell me something like how many Flintstones you have so far? I mean we have to  
497 have some dialogue.  
498 ZACH: You could like this could happen with me, "cure 2 more animals and I will tell  
499 you where he is." Whatever.  
500 [RO: Having students think about role of the player. Is the player having fun in their  
501 game?]  
502 R: We got to change it up a little again. I'm mean, like again I'm just not having fun.  
503 What's the quest here?

504 SARAH: I run around in circles..... (laugh) umm...

505 R: Is there something you would like to do, like....so this guy knows it's a Flintstone

506 vitamin?

507 MARTY: Yeah.

508 R: So could have him do something to be able to go, other than....

509 ZACH: I don't know what he could do.

510 R: Well you guys think about how to make it more engaging. Like would you play this

511 game and going up to every animal and be like, "Hi" and then animal tell you "this is

512 what happened to me."

513 ZACH: Probably not.

514 R: Because seriously, you guys are a team here and whose not going into game

515 development? All you guys are? – Are you, yes? No? You don't know?

516 [RO: not necessarily wanting or knowing how to be successful in a team, judgmental

517 about team members]

518 R: Who thinks they are not going to have to work in "teams" while in the work place? Is

519 there anyone who thinks it is easy to work in a team?

520 MARTY: I'd rather work by myself. But obviously you have to work in a team to get

521 some stuff done.

522 R: Why would you rather work by yourself?

523 MARTY: I don't know, it's easier by myself.

524 R: Yeah and that is because you have to communicate and collaborate, all that.

525 ZACH: Sometimes if you have a really good team, sometimes it is easier to get a lot

526 work done but when you have a team that you have members that don't do anything, then

527 it is easier to do it by yourself, just get it done your way and it's done.

528 R: What do you think, Marty, team?

529 [RO: Need for collaboration for authentic activities in real-world]

530 MARTY: Well, it depends like what way you do it. Well, it depends on what you are

531 doing. I think teams are needed.

532 R: In the real work, you're going to need it. Like, how is this similar, us sitting here in

533 this team to the real-world?

534 MARTY: Well, this, you can't not be in a team in the work place or whatever. Because

535 when you work for a company, you all have to interact to get stuff done.

536 R: So do you think this is kind of similar to the real-world? In some ways?

537 MARTY: Yeah, because if you work by yourself, their probably aren't going to like you,

538 because.... I don't know.

539 R: So what is it going to be like one of the things that you don't deliver, say Paul doesn't

540 deliver his piece, which is like the backstory, what happens then with the rest of the

541 team?

542 MARTY: They fall behind because they don't have that backstory, so; then they all have

543 to make up what for you are lacking basically.

544 R: And then also, what about grade? I mean, what about altogether, like your whole

545 product? (pause) So back to that character assignment, do you want to talk about it at all,

546 or do you want to touch on it? Is everybody creating an object?

547 MARTY: Well, I haven't been on it since yesterday, so I don't know if I'm like a

548 member yet?

549 SARAH: I made a glass tube for it. That's about it.

550 R: Well we now we came up with some things that we need to create so umm.....  
551 MARTY: A dog house.  
552 R: We talked about a dog house. What were talking about earlier in second life...we said  
553 something else for you.  
554 MARTY: A cave.  
555 SARAH: I was doing a bottle. I got a long glass tube. That's about it.  
556 ZACH: He was doing a cage.  
557 R: Who was?  
558 ZACH: Evan.  
559 R: A cage. Well that's kind of a neat one, so when we get to the doctor, we could have a  
560 bunch of things in there.  
561 ZACH: Yeah, he was just sketching it out before you got here. But I don't know to get  
562 that from Second Life.  
563 R: So is anyone taking notes for who is responsible for what for your game.  
564 MARTY: No (laugh)  
565 ZACH: Well, you were doing the backstory, you were going to your dialogue rabbit and  
566 stuff, I am updating the rules and umm...  
567 SARAH: Dialogue and my character are fine.  
568 ZACH: Yeah, he was doing his dialogue for his character.  
569 R: What about the change thing that he is doing. But you don't have it written down.  
570 Who is writing down? I want somebody else than Zach. He seems to be taking up  
571 responsibility for this group a lot. Who is writing it down.? Are you going to write it  
572 down? I mean, post on the discussion board, Marty? Are you going to post on the  
573 discussion board what everybody is doing?  
574 MARTY: Oh, okay.  
575 R: Alright, moving on. You guys are going to so surprise me tomorrow morning. I am  
576 going to have so much fun playing this game....all right?  
577 R: How much time do we still have?  
578 SARAH: I have to study for a test.  
579 R: So guys, the character thing? Did we talk about who is creating what, then?  
580 EVAN: I was creating a scalpel, but I don't know...  
581 R: Who is creating the Flintstone vitamins?  
582 SARAH: I thought I was doing the pill bottle.  
583 R: So make sure you get everybody's object in there. How are you guys going to use the  
584 bottle. Like you can make the bottle sort of like, at the end, the quest...remember when  
585 we were thinking of what to do? You could be like, "Make sure you put all the  
586 Flintstones you've collected in the glass bottle...so that we could cure the final animals in  
587 the cage." And then he has them in the cage, and he does that....did you get that Evan is  
588 doing that thing where he is switching over things?  
589 MARTY: Switches over what?  
590 ZACH: For this thing tomorrow. In the real game, like I was just thinking that if it was a  
591 real game, I mean obviously there would be a big battle between Dr. Crosby and his  
592 master creation and Peter. But for the sake of tomorrow, I guess there should be a cage  
593 and we could just cure all the animals in the cage. Because you can't really do a battle in  
594 Second Life.

595 R: But that is the battle. The battle is the quest. Would you have that much of a battle in  
596 the WOW game? Or maybe I guess you do. Well okay, but what is the quest then?  
597 ZACH: Usually it is like, talking WOW, the quest is most of the time involves a battle  
598 and then they usually drop the item that you need and then you bring it back.  
599 R: Drop the item?  
600 ZACH: Like basically, like when you kill something. They have the items on it. And  
601 then you pick it up after its dead. So like most of the time the quest you get to kill  
602 something and then usually they have the item that you need from that guy or whoever,  
603 gave you the quest...Like say, they need a cage or something like that, and then you kill  
604 an animal and then it drops the cage and then you pick it up and bring it back to whoever.  
605 R: I have a great idea...or maybe its not. But anyway, lets say you have the key to the  
606 cage, and so now Peter has to fight with you. But I mean the fight thing can be just as  
607 simple as written in the chat..."boom boom boom boom boom." And then you give me  
608 the key and I bring the key over here.  
609 ZACH: That's a good idea.  
610 ZACH: Crazy animals.  
611 R: Crazy animals. What do you guys think? That makes it kind of fun.  
612 ZACH: Because I was wondering how to do the battle thing.  
613 R: You could use some sounds, maybe? I think you guys were using the sounds. If you  
614 found some free sounds.  
615 SARAH: I have a crash sound. It says "I crashed" in the chat. I got "human error."  
616 R: "Human error." That might be a good one to us. So maybe you can transfer that over  
617 to him. Okay, pitch it to him.  
618 ZACH: Basically for the ending battle, Dr. Crosby has the key to the cage with all the  
619 animals in it and it can just basically simulate a fight rally, pow pow chat or whatever and  
620 then gives him the key and then rescues the animals.  
621 EVAN: Like the animals that are in the cage, are they the animals that are non-  
622 medically?  
623 ZACH: I was thinking, yeah, they could be like non effected. That he hasn't worked on  
624 them yet.  
625 R: Some of them have the wings? I don't know.  
626 ZACH: They are normal animals, like before he started working on them.  
627 EVAN: So are we going through the whole game?  
628 ZACH: Just the forest, just like the last part. Like the forest/the mansion. You know,  
629 where you talk to all the animals at the end and you fight Dr. Crosby.  
630 R: Each animal needs to say what their background and their problem is, and a riddle for  
631 the next item. So that is your dialogue that can help you for the character.  
632 ZACH: Remember he is the rabbit, dog, bear with wings, whatever. So everybody needs  
633 to create a ....  
634 R: I think he should be a bird...mmm.  
635 ZACH: Bird?  
636 R: Like Kevin....  
637 (Everyone laughs)  
638 SARAH: So do I give the wings to him?  
639 R: Yeah.  
640 EVAN: So what time are we meeting tomorrow?



641 ZACH: 10:30.  
642 R: So this helps you guys with a character thing, because everybody now has an object  
643 and everybody now has a dialogue. Correct? You have the cage and you also have that  
644 interaction piece?  
645 MARTY: What interaction piece? Like the animals that change?  
646 R: Yeah, and I don't know you are envisioning this, at this point still.  
647 MARTY: I'm going to go work on my dog house when I get back.  
648 EVAN: What do I need a cage for?  
649 R: That is where all the animals are stored.  
650 R: And for the character assignment, like I think only one person passed in their character  
651 assignment.  
652 ZACH: Like RPG2?  
653 R: Yeah, and that is a one-individual assignment, I think. I have one more question. Did  
654 this help?  
655 ZACH: Yeah, it did help a little bit. I like knowing what we are going to do in the next  
656 week, because when we didn't know, it was kind of like blind-sided. I kind of like that  
657 schedule.  
658 MARTY: What is the three SL effects.  
659 R: That is coming up.  
660 MARTY: Will we have to do that?  
661 R: This is individual, this is with your team, and this is part of these projects, and this is  
662 how much each is worth.  
663 MARTY: So we have to find three Second Life effects?  
664 R: That is coming up; you have so much to do over here. (laughing)...no I think it is like,  
665 that might be when we are first talking about it, if somebody was just starting Second  
666 Life, like what would you suggest to be three keys of Second Life FAQs kind of things  
667 that you would do. So I'm looking at these journals and I only have 3 of Zach's, 1 of  
668 Sarah's and 1 of Paul's?  
669 MARTY: I did 4, I'm pretty sure.  
670 R: So I might be missing one of yours. Sarah?  
671 SARAH: Oh yeah, I am still....  
672 R: That's okay.  
673 MARTY: Can we still turn in the ones, like...  
674 R: I think he said you guys could still turn them in. The only thing he was saying is, and  
675 I noticed this too, some people say "Well, I didn't learn anything this week (a) and then  
676 (b) and I wouldn't add anything new." Which is a clever way of say "yeah, I did that  
677 assignment." But we know that game! (laughing)  
678 R: So then think about what you have learned in your games, like the ones that we talked  
679 about? That could be helpful.  
680 EVAN: So is that is from you have learned from the classes or is that from other  
681 experiences?  
682 R: From other experiences too. Like if you want to add something to it, you could be  
683 adding to it. Or if this is not your first time, in the second part where it talks about like if  
684 this is not your first time in the 3-D virtual world, which for a lot if you which it is not,  
685 then what would be good suggestions for those that if it is their first time, or what did you  
686 learn when it was your first time that you were in there. Does that make sense?

687 MARTY: Yeah.  
688 [RO: found the rubric helpful]  
689 R: What about the first assignment, you had this RPG1. Does this look familiar at all?  
690 MARTY: Yeah.  
691 R: This is the free one. Did that help having that versus not having it for RPG2?  
692 Because RPG2, yesterday, when we were discussing it, it seemed like nobody had a  
693 script for their object or a dialogue.  
694 EVAN: Yeah, I think it did help. Because I didn't know about RPG2, well I did know  
695 but, I didn't know it was an individual until I emailed the Instructor. So I was like, "what  
696 do we need for this assignment?" But then I read it and it was kind of easy.  
697 R: Marty, what do you think?  
698 MARTY: Ah, I don't know.  
699 [RO: He just didn't say much, but he doesn't contribute much in class chat either. Also,  
700 didn't do his homework. Appears like a smart young male as his team members treat  
701 him, yet very minimally engaged. He inquired about getting membership in the group to  
702 build; something he should've had completed a long time ago. Also, last minute  
703 comments about whether we got his journals. What does it take??]  
704 R: Paul, doesn't like the virtual world? [RO: I had asked him this as his face appeared  
705 very sour about the whole thing. Turns out the missed the embedded ready-made  
706 interactivity of games.]  
707 PAUL: I don't normally like Second Life.  
708 R: Why not?  
709 PAUL: No action. I like action.  
710 ZACH: Its fun but, I mean for a classroom, it is pretty cool, but I can't see myself going  
711 on it after or before class, basically not before class, like I really don't want to like fly  
712 around. I guess it's pretty cool for some people. Like I was watching this true life, and  
713 this girl was playing SL and she like does concerts and stuff, and that was pretty cool, but  
714 I don't know, not for me...  
715 [RO: SL – more likely for females?]  
716 R: Well I guess a lot of places have businesses or do prototypes of games or prototype for  
717 buildings in Second Life. There is also a lot of junk and prostitution too. But one of the  
718 things about a virtual world is that it is kind of like a simulation of the real-world. Where  
719 as with a game you have the rules, you have a goal, it's created to be sort of like fun for  
720 the target audience. Does that make more sense? Even perhaps, Sarah and I might even  
721 have more a fun time in Second Life than like younger generation males. Does that make  
722 sense at all.  
723 All – Yeah.  
724 ZACH: It just depends on the person.  
725 [RO: preference of SL and real-world versus Discussion Board and real-world for certain  
726 types of courses.]  
727 R: Because we could go shopping or get objects or share objects or something, or talk to  
728 people, strange people, speak languages. Or maybe I'm wrong. But anyway, so, guys,  
729 the thing is what I am trying to figure out with this research and maybe you can help me  
730 with. Is that sometimes they do these hybrid classes and the hybrid class is like,  
731 okay....one class we meet in the real-world, and the next week we meet and we do a  
732 discussion board. And that's just to post an article and you go on the discussion board

733 and read and read and read. If you are doing a design type thing like game design or if  
734 you are doing some kind of class like this or project, do you think that this gives you  
735 some opportunity to start building or start collaborating or to work on design type  
736 projects when you are like in the Second Life world, in an educational sense? Any  
737 thoughts on that? Like if you were going to do a hybrid class, would you rather do a  
738 discussion board and face-to-face or would you rather do it Second Life and face-to-face?  
739 MARTY: Second Life and face-to-face.  
740 ZACH: Yeah.  
741 [RO: other than f2f, use of blended learning, visual and interactive learning]  
742 R: The other question is like okay, you are in Afghanistan or the Middle East and you're  
743 fighting right now, and we need to send you for training; and the only way we can send  
744 you for training is through Second Life. would you tell that instructor for that training to  
745 be useful for you? Because you have to learn how to use this airplane and fly it  
746 tomorrow....so you got to know how to use it. He is coming into Second Life for one  
747 time only, what would you tell him; how would you tell him to do this training; I don't  
748 know if I'm painting the picture. But that's it....You have no option for face-to-face.  
749 I'm going around.  
750 PAUL: Just make it.  
751 MARTY: I guess just send all the information over, so that it doesn't have to be  
752 altogether. It doesn't have to be all on Second Life, because the information could be  
753 transferred and then they could read after they get off.  
754 R: So they have both reading material and simulation, because they have to learn how to  
755 fly it.  
756 PAUL: I would hope that I would have some kind of object that I could look at to  
757 actually learn how to do it, because I am more like a visual learner, not like reading and  
758 learning as well. So I need to have something to interact with as I'm learning.  
759 R: So you would have the piece and then each item in the cockpit. So each item you  
760 would be click on it and would say what it is, but then you could also fly it to see how it  
761 feels? So that you could also interact and have a simulated battle.  
762 EVAN: Yeah, something like that. I don't know....just something that I can relate it to in  
763 life.  
764 R: And then part of the training is that well now, you're going to be dropped and you  
765 have to the leaders of this troupe, but you don't really know the language. So how would  
766 you learn that in Second Life? The language, how would you practice it....what would  
767 you tell your instructor that helps you learn when you are in there.  
768 SARAH: Something like Rosetta Stone.  
769 EVAN: Like I took German fourth year in high school and it was a lot of back and forth  
770 and you've got to keep practicing and practicing.  
771 R: Right, but let's say that you are at that base for a long time and you are practicing,  
772 practicing and you are actually practicing with Germans? What about you guys? I mean  
773 do you know what I'm asking?  
774 MARTY: Sort of.  
775 SARAH: I don't know.  
776 R: In this scenario, there is no face-to-face option.  
777 EVAN: You could talk to them with the headset.  
778 R: Do you like the headset?

779 EVAN: That's what I do every day.  
780 R: Do you think it would be better for him to headset and talk to a group first. I mean,  
781 remember when you guys were saying "lecture, ahh."  
782 ZACH: For me, I definitely wouldn't want a lecture. I would rather read something or  
783 visual or send me something or talk to me about it. I wouldn't like just sitting there and  
784 listening to him talk about it.  
785 [RO: learning a language also by 'learning by doing']  
786 EVAN: No, no not like then, like have interaction between people like with voice but  
787 also having playing visual objects in the game.  
788 [RO: intimacy/immediacy of voice between friends with similar gaming interests]  
789 R: So when you are doing your thing, when you are playing your game, are you doing  
790 voice and chat, or just voice?  
791 EVAN: Mostly voice, because I talk to my friends.  
792 R: Well, I think this is great. Thank you very much. I don't know if helped a little bit,  
793 PAUL: Oh yeah, it helped a lot.  
794 EVAN: 10:30?  
795 R: It's going to be great.  
796 EVAN: - I'll probably be tired still  
797 R: If is any consolation, I'm not 'morning' neither.  
798 End

**APPENDIX F CASE STUDY SCENE**

## Authentic Learning Multi-User Virtual Environment

## Stages of

- a real-world project

## Parts of

- a virtual world classroom environment
- a physical and online environment external to virtual world classroom

## Kinds of

- activity perspectives
- team roles
- teaching and learning resources
- virtual world communication media
- virtual world interactions
- Millennials in a game development course
- challenges in learning through a virtual world

## Strategies for

- modeling in a virtual world
- coaching in a virtual world
- virtual world integration

## Attributes of

- active learning strategies in a virtual world
- reflective learning strategies in a virtual world
- collaborative learning strategies in a virtual world
- authentic activities in a virtual world
- authentic assessment in a virtual world
- an authentic environment in a virtual world
- authentic multiple perspectives in a virtual world
- authentic modeling in a virtual world
- authentic coaching in a virtual world

## APPENDIX G DOMAIN ANALYSIS

### G.1 Domain Analysis Worksheet: Sequence

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#### Domain Analysis: Sequence

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Included Terms	Semantic Relationship	Cover Term
	is a stage in a	real-world team project

#### Phase I

##### Week 1

Assimilating to the virtual world environment.

Team building toward an active game development team member.

##### Week 2

Collaboratively writing a Role-Playing Game (RPG) game narrative and associated components such as theme, backstory, etc.

##### Week 3

Designing personal avatar to reflect an NPC character of the RPG game.

Writing the character profile, a sample character dialog, and RPG game sample dialog-trees.

#### Phase II

##### Week 4

Creating and finding 3-D objects and/or scripts for NPC character assets (e.g. an arrow) and game environment 'look and feel' (e.g. a castle).

Practicing role-playing the team RPG game using personal avatars as NPC characters

- visual communication of their 'look and feel' and assets
- verbal communication through dialog; and
- behavioral communication through their actions.

##### Week 5

Designing and developing an RPG game segment from the narrative with player goals, rules, choices and/or level options.

Choosing and/or developing additional assets and environments and other game components (e.g. mechanism for accumulation of points) to role-play a segment of the RPG game.

#### Phase III

**Week 6**

Continuing week 5 activities. Optionally scripting objects and/or animating characters.

Prototyping (role-playing) RPG game with random guest players.

Revising game based on recommendations and reflection.

**Week 7**

Prototyping RPG Game by role-play of personal avatars as NPCs with a Player who is randomly-chosen from another Team. (The final 20 minute live game segment is videotaped through the Player's camera viewpoint.)

Evaluating the game in the role of the actual or potential player and/or client.

Reflecting on the experience and writing a reflection about their team's enactment and other teams' RPG enactments (connecting it to course content--what worked and what didn't and why, with suggestions for the next iteration).

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## G.2 Domain Analysis Worksheet: Spatial

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Semantic Relationship:	Spatial
Form:	x (is a part of) y
Example:	A lens is a part of a camera.
Structural Questions:	What are other parts of y?

---

Included Terms	Semantic Relationship	Cover Term
	is a part of	virtual world classroom environment

Lecture and demonstration area e.g. classroom or auditorium  
 3-D building area e.g. Sandbox  
 Designated area for each team  
 Team Project environment area  
 Part of classroom that is external to main class activity  
 Part of the island external to the classroom  
 Virtual world external to the island the classroom is on  
 Interiors of buildings and other 3-D structures  
 Surfaces or areas of 3-D objects  
 Ground-level  
 Sky  
 Underwater  
 Communication tool only  
 Other tools

---

Included Terms	Semantic Relationship	Cover Term
	is a part of	physical and online environment external to virtual world classroom

Non-course-related quests/ventures into 3-D virtual world area external to main class-activity  
 Learning Management System e.g. Blackboard  
 Website resource  
 Email  
 Chat client e.g. Skype  
 Web 2.0 tool e.g. Facebook  
 Online game e.g. WOW



Subject area application e.g. GameMaker

Document within application e.g. Excel Worksheet

PC game e.g. GTA

Files not related to class e.g. Photos

Dorm/Home computing area (computer, desk, chair)

Areas outside of computing area e.g. sleeping area, bathroom, kitchenette

Mobile technologies: texting, calling

Other distracters from virtual world class activity

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## G.3 Domain Analysis Worksheet: Strict Inclusion

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Semantic Relationship:	strict inclusion
Form:	x (is a kind of) y
Example:	A dragonfly is a kind of bug.
Structural Questions:	What other kinds are there?

---

Included Terms	Semantic Relationship	Cover Term
	is a kind of	activity perspective

Student listening (Mini Lecture)  
 Game player (Testing Game Projects)  
 Game component (Role-Playing Non-Player-Character (NPC) in Game)  
 Game developer on a game development team (Collaborating on Project)  
 Interviewer/Interviewee (Interview Activity)  
 Debater (Debate Activity)  
 Evaluator (Evaluation Activities –Instructor’s narrative, teams' games)

---

Included Terms	Semantic Relationship	Cover Term
	is a kind of	team role

Advisor  
 Conversation starter (often devil's advocate too)  
 Researcher  
 Tech help  
 Leader (often facilitator too)  
 Communicator  
 Leader assistant  
 Reflector

---

Included Terms	Semantic Relationship	Cover Term
	is a kind of	teaching and learning resource

Subject area materials  
 Course design resources  
 Communication media  
 3-D environment  
 In-world development tools

Presentation tools  
 Websites accessed from in-world  
 Notecards  
 Learning objects  
 In-world educational resources

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Included Terms	Semantic Relationship	Cover Term
	is a kind of	virtual world communication media
Chat Voice Audio Instant Messaging 3-D Avatar expression e.g. choice of skin and attire 3-D Gesture e.g. animation 3-D Spatial location e.g. place on map 3-D Spatial motion over time e.g. patterns 3-D Environment expression e.g. creation of their area 3-D Object expression e.g. creation of 3-D objects Hybrid communication		

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Included Terms	Semantic Relationship	Cover Term
	is a kind of	virtual world interaction
Student-expert Student-student(s) Student-team Student- individuals external to course Student- interactive learning objects (e.g. interactive 3-D object created for their game) Student-through virtual world communication media (e.g. a student may communicate where they are, depending on their settings) Student-virtual world tools (e.g. editing their 3-D avatar appearance with the in-world avatar editing tool)		

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Included Terms	Semantic Relationship	Cover Term
	is a kind of	Millennial in a game development course*
Gamer Non-Gamer Gamer/Team Leader Female Non-Gamer Underrepresented Student Low Motivation Student		

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Included Terms	Semantic Relationship	Cover Term
	is a kind of	challenge in learning through a virtual world*
Comfort with ambiguity Creativity Collaboration Participation Maturity Bias		

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## G.4 Domain Analysis Worksheet: Means-End

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Semantic Relationship:	means-end
Form:	x (is a way to do) y
Example:	Drinking water is a way of staying healthy.
Structural Questions:	What is a way to do y?

---

Included Terms	Semantic Relationship	Cover Term
	is a strategy for	modeling in a virtual world
Instructor example preferred over rubric as a roadmap for an assignment Providing examples of 'model' student work Integrating real-world examples Making a variety of learning resources available Inviting expert guests Leading by example Peer evaluation Encouraging interaction with experts external to class Demonstrating (e.g. 3-D modeling) Being comfortable with using technology		

---

Included Terms	Semantic Relationship	Cover Term
	is a strategy for	coaching in a virtual world
Scaffolding through use of positive reinforcement Facilitating active, reflective and collaborative learning Engaging learner in activities relevant to him or her Being flexible and not controlling of the learning environment Providing access to coaching or critiques by external experts Being personally invested and immersed in facilitating projects Responding with meaningful feedback to student input and work Encouraging participation through getting to know students on an individual basis Creating an open atmosphere for peer coaching Listening to what is being said and what is not Socratic questioning Utilizing classroom assessment techniques Directing to useful resources at key points		

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Included Terms	Semantic Relationship	Cover Term
Aligning to institutional culture Aligning to institutional initiatives Aligning to program goals Aligning to course content needs Aligning to student body characteristics Aligning to instructor teaching style Aligning to existing technology infrastructure or supported innovations Researching existing technology integration resources and support mechanisms Researching competitor alternatives Researching cost, reusability, scaling-up Researching through a pilot implementation Providing technical infrastructure resources Providing instructional technology support Providing instructional design support Providing feedback mechanisms Providing communication of best practices for continuous improvement Providing solutions for management of innovation	is a strategy for	virtual world integration**

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## G.5 Domain Analysis Worksheet: Attribution

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Semantic Relationship: Attribution  
 Form: x (is an attribute of) y  
 Example: A long body is an attribute of a dragonfly.  
 Structural Questions: What other attributes are there?

---

Included Terms	Semantic Relationship	Cover Term
	is an attribute of	active learning strategies in a virtual world

Various ways of expression and class session choreography tend toward more learning engagement

Slight increase in participation in virtual world compared to face-to-face

More conducive to collaborative versus individual active learning

Wide range of learning domains and problem types possible for real-world project

May be more conducive for higher level and affective domains versus lower level learning domain

\*Nature and frequency of communication unique compared to that of real-world

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Included Terms	Semantic Relationship	Cover Term
	is an attribute of	reflective learning strategies in a virtual world

Opportunities for peer reflective learning and self-reflective learning

Five types and three levels of reflective learning

Lack of familiarity with reflective learning

Challenges with adapting to a reflective practice, difficult to assess

Slight improvement when structure and prompting added

---

Included Terms	Semantic Relationship	Cover Term
	is an attribute of	collaborative learning strategies in a virtual world
Initial teamwork idealism and the reality of working together - Not easy to to all participate, yet balance each others' input		
Conducive to collaboration and a synthesis of ideas versus division of labor		
Team leaders modeling learning engagement and motivating their team members		
Team leaders developing or weighing down a collective vision?		
Challenges due to team members with low motivation, small teams, and a need for enhanced individual accountability mechanisms		
Team behaviors and strategies mirror face-to-face ones, including stages of storming, forming, norming, however, more transparency and communication needed		
**Comfort with communication and environment precedes successful collaboration		

Included Terms	Semantic Relationship	Cover Term
	is an attribute of	authentic activities in a virtual world
A variety of tasks and perspectives suggested for learning engagement		
Need to tie activity significance to course and to situate it with guidelines		
Conducive to a variety of simulation: authentic teamwork, real-world problem-solving, and game development experience		
Need for progressive staging of real-world team project		
Projects resulting in unique approaches, interestingly--all with societal or environmental concerns		
Different authentic problems may be embedded in the activities		
Co-creation and role-play activities especially conducive to authentic learning environment engagement		



Included Terms	Semantic Relationship	Cover Term
	is an attribute of	authentic assessment in a virtual world
Outcomes achieved for real-world team projects		
Alignment to authentic activities and to transfer environment		
Challenges due to identification of indicators, time, and lack of access to longitudinal data		
Need for further development of methods, tools, rubrics, checklists, and positive reinforcement strategies		
Final exam scores on ‘items related to portion of course in SL’ equivalent to scores on ‘items aligned to face-to-face portion’		

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Included Terms	Semantic Relationship	Cover Term
	is an attribute of	an authentic environment in a virtual world
Benefits of rich environment, however resources and tools may compete for attention		
Environment may be confusing, yet it is also convenient		
Open-ended context requires personal initiative, research, and problem-solving skills		
Gamer reticence toward Second Life		
Frustration with others’ abilities in communicating and navigating in environment		
Technical skills expected of instructor; otherwise, another reason to lose attention		
Virtual world presence harder to gauge than face-to-face, easier than “online only”		
Undergraduate discomfort with different methodologies and environments		
**Engagement for sustained projects or problems in disciplines		
**In-world tools may need to be enhanced for discipline-specific purposes		
**Probability of distraction may be less than virtual conferencing, more than real-world		

\*\*Co-creation of classroom environment takes time

\*\*Need for IT, instructional, and 3-D development support

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Included Terms	Semantic Relationship	Cover Term
	is an attribute of	an authentic community in a virtual world

#### Multiple perspectives

Multiple perspectives embedded in activities, allowing for empathy, socialization

Variety of team roles students identified with, however, guidance and rotation needed

Virtual world socialization external to the classroom similar to real-world socialization

External influence on class may contribute to virtual world socialization

#### Facilitating learning through modeling

Needs beyond instructor's content expertise

Instructor example preferred over rubric as a roadmap for an assignment

Importance of leading by example for an authentic learning community

Enhanced learning engagement with personal examples and integration of real-world examples

Need to integrate the variety of learning resources and also increase usage

Interaction encouraged with experts external to class

Possibility of social and behavioral benefits from virtual world exploration

#### Facilitating learning through coaching

Scaffolding and use of positive reinforcement encouraged

Facilitating active, reflective and collaborative learning versus delivering lectures

Requests for more 'learning by doing' and topic-related discussion that relevant to learner

Being experimental versus controlling leading to a richer learning environment

Effects on psychological and social feeling of presence

Benefits of critiques

Need for being personally invested in coaching and responding with meaningful feedback

Encouraging participation through getting to know students on an individual basis

Creating an open atmosphere for peer coaching

\*\*Avatar representation either mimics real-life or creates a fantasy identity

\*\*Assimilation to virtual world culture takes time

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Included Terms	Semantic Relationship	Cover Term
Comfortable with ambiguity	is an attribute of a	Gamer/Team Leader*
Showing interest in demonstrating creative expression and problem solving		
Resourceful and initiating collaboration		
Self-directed, willing to take risks, and to put in the extra effort		
Proactive in planning for future job skills and practical applications		

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Note. \*Items found through research question two. \*\*Items found through research question three.

## APPENDIX H TAXONOMIC ANALYSIS

### H.1 Taxonomic Analysis Worksheet: Spatial

#### Learner locus of attention in the virtual world classroom

##### Virtual World

##### Level

- Sky
- Ground-level
- Underwater

##### Encasement

- On: Areas of 3-D objects e.g. sitting on a chair
- In: Interiors of buildings and other structures e.g. in a 3-D castle
  - Out: Not limited by other 3-D objects e.g. flying

##### Tools

##### Virtual world classroom area

###### Class-Activity

- Lecture and demonstration area e.g. classroom or auditorium
- 3-D building area e.g. Sandbox
- Designated area for each team
- Student Team project areas

###### Non-Class-Activity

- Area of classroom that is external to main class activity

##### Area external to virtual world classroom area

###### Class-Activity

###### Exploratory, task-related, or quest activities:

- Area of the island external to the classroom
- Virtual world external to the island the classroom is on

###### Non-Class-Activity

- Virtual world external to the university courses' area of the island
- Virtual world external to the island the course is on

##### SL Tools

###### Class-Activity

- SL communication media tools used in main class activity
- SL communication media tools external to virtual world main class communication

###### Non-Class-Activity

- Other SL tools (other than communication media tools) used in main class activity
- Use of SL tools external to main virtual world main class communication

## Physical and Online other than Virtual World

## Computer screen (online)

## Class-Activity

- Learning management system e.g. Blackboard
- Documents within applications e.g. Excel Worksheet
- Email

## Non-Class-Activity

- Web 2.0 tools e.g. Facebook
- Chat client e.g. Skype
- Online games e.g. WOW

## Computer Screen (other than online)

## Class-Activity

- Subject area application e.g. GameMaker
- Document within an application e.g. Excel sheet

## Non-Class-Activity

- PC game e.g. GTA
- Files not related to class e.g. Photos

## Dorm/home computing area

## Class-Activity

- Dorm/Home computing area e.g. computer, desk, chair, team texting
- Book
- Other paper-based resources

## Non-Class-Activity

- Areas outside of dorm/home computing area e.g. kitchen
- Mobile devices e.g. iPhone
- Other distracters from main class activity

## H.2 Taxonomic Analysis Worksheet: Strict Inclusion

Multiple perspectives and roles

Included Terms	Semantic Relationship	Cover Term
Mini lecture - Student listening	is a type of	class perspective
Activity-embedded - Interviewee Interviewer Evaluator (evaluating instructor story and peer games) Debater		
Project-embedded - Game developer on a game development team Game player testing or reviewing game Role-playing non-player- character (NPC) in game		
More identified with – Tech help Advisor Researcher Leader Leader's assistant	is a type of	team role
Less identified with – Note-taker Devil's advocate (Conversation starter) Facilitator Reflector		

## H.3 Taxonomic Analysis Worksheet: Means-End

Virtual world (Second Life) integration in higher educationResearching

## Exploration

- Needs, problems, and questions
- Scaling-up and reusability
- Opportunities for piloting

## Resources

- Technology infrastructure, integration resources, and support mechanisms
- Cost, competitor alternatives, and add-ons
- Successful implementation examples

## Communication

- Participating in external and internal learning communities
- Creating interest and buy-in (grass-roots and administration)
- Developing an integration plan

Designing and developing to align to university context

## Institutional-level

- Institutional culture
- Institutional strategic plan and initiatives
- program goals

## Course-level

- Course content needs and objectives
  - authentic learning project macro objectives
  - class session goals and sequencing activity objectives
- Student body characteristics
- Instructor teaching style
- Existing technology infrastructure

Utilizing new media with continuous improvement

## Providing adequate resources and support

- Technical infrastructure resources
- Instructional technology support
- Instructional design support
- Recommendations for future management and sustainability

## Continuously evaluating and implementing modifications

- Gathering feedback for continuous improvement
- Documenting lessons learned
- Recommending and implementing findings for improvement
- Re-evaluating modifications
- Marketing successes
- Scholarship of teaching and learning with technology

## APPENDIX I COMPONENTIAL ANALYSIS

Table 4.2.6

*Componential Analysis - Millennial Learner Types with Respect to Observed Comfort with Ambiguity, Creativity, and Collaboration*

Learner Type	Comfort with Ambiguity	Creativity	Collaboration	Average <sup>1</sup>
Gamer/Team Leader	3	3	3	3
Female Non-Gamer	2.5	3	2.5	2.6
Non-Gamer	2.5	2.5	2	2.3
Gamer	2	2	2	2
Underrepresented Student	1	2	2	1.6
Low Motivation Student	1	1	1	1

*Note 1.* 1: Minimally observed; 2: Moderately observed ; 3: Substantially observed



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**ABSTRACT****A HIGHER EDUCATION CASE: MILLENNIAL EXPERIENCE TOWARD  
LEARNING IN A VIRTUAL WORLD DESIGNED AS AN  
AUTHENTIC LEARNING ENVIRONMENT**

by

**MARIJA FRANETOVIC****May 2012****Advisor:** Dr. Monica Tracey**Major:** Instructional Technology**Degree:** Doctor of Philosophy

Current educational initiatives encourage the use of authentic learning environments to realistically prepare students for jobs in a constantly changing world. Many students of the Millennial generation may be social media savvy. However, what can be said about learning conditions and student readiness for active, reflective and collaborative learning and media literacy within their discipline? Virtual worlds such as Second Life (SL) represent future hybridized work environments which can support authentic learning. With their immersive and interaction affordances, virtual worlds may be designed to incorporate real-world team projects for both online and blended courses.

This qualitative single embedded case study sought to understand learner experiences regarding the authentic learning environment instructional design which was provided through Second Life. The study took place in a higher education game development course facilitated through SL during the fall 2009 semester. The goals of the student project were to work in simulated real-world teams to design and co-create a game, test the game by role-play as non player characters with a random student player, experience game development requirements, and

reflect upon lessons learned. The research study took place at a mid-size private university in a Midwest metropolitan suburb. Participants included eighteen Millennial generation students who had never used SL in a formal learning setting. The majority of the students were white male gamers majoring in STEM disciplines. Data collection included participant observation over a three month period, 75 student journal entries, 12 in-depth interviews, and four student focus groups. Data analysis included domain, taxonomic, componential, vignette, and theme analyses and trustworthiness methods. The case study was presented through abstract models of learner processes, rich thick detailed descriptions, theme analysis matrices, and in-world snapshots.

The case study scene was parsed into three components representing learner needs in an authentic learning multi-user virtual environment (ALMUVE): 1) support of authentic active, reflective and collaborative learning, 2) design of authentic activities and assessment, and 3) creation of an authentic learning environment and community. Students exhibited active learning over a range of learning domains and problem types through the team project. Chances of sustained learning engagement increased when class sessions were choreographed and activities were varied. Both peer-reflective and self-reflective learning were facilitated and categorized into five types, ranging from low to high levels of self-reflection. Students were not comfortable with reflective writing and they requested more structure. For virtual world collaborative learning, participation and synthesis were observed rather than division of labor found with other tools. Though team behaviors mirrored face-to-face ones, there was a need for increased transparency and communication.

Authentic activities need to be progressively staged with a variety of perspectives and tasks to construct a real-world team project. Co-creation and role-play activities were conducive



for ALMUVE engagement. Authentic assessment mirrored authentic activities and included opportunities for assessing individual and team efforts. The study showed a need for more authentic assessment methods for virtual world team projects. Team projects were successful, with each team developing and enacting an innovative game with their own interpretation of game narrative, characters, environment, player choices, goals and rewards, and methods of interaction. Though a rich environment could be created, the locus of class activities as well as resources and tools competed for student attention. There was a need for additional technology, instructional design, and 3-D development support as well as a need to match the instructor's use of technology to that required of students. Embedding multiple perspectives in activities created opportunities for immersion and interactivity. More team role rotation and accountability, modeling and coaching strategies may enhance engagement. Students desired more 'learning by doing' to take advantage of virtual world attributes.

Millennial learner types of the game development course were identified in terms of their perspectives toward virtual learning. Gamers who played mostly first-person shooter games exhibited a bias toward learning in SL, viewing SL in terms of the games they play. It was difficult for them to visualize how game development could be taught using SL. They may also have viewed the virtual world building subculture in contrast to their own gaming subcultures. Gamers, who were engaged team leaders, demonstrated comfort with ambiguity, creativity, collaboration, self-confidence, and an inclination toward lifelong learning. These characteristics aligned to class challenges with ALMUVE engagement.

Virtual world media effects were explored regarding evolution of communication practices, student-development of the 3-D environment, and progression of collaboration on the project. Communication was found to be short, frequent and transmitted through various tools.

There were inferred differences between affordances and cultures of a virtual world, an MMORPG, and uses of an application. As the communication became easier and more expressive, a more authentic 3-D environment developed. Likewise, team collaboration increased with co-created 3-D environments and role-play.

This case study has implications for instructional designers and faculty interested in creating real-world learning experiences using virtual worlds. The findings illuminate instructional design considerations when creating virtual world learning environments for Millennial students and for the gamer subculture in particular. The study is also applicable to instructional design constructivist studies, studies related to learning through virtual worlds, studies involving Millennial subcultures, and studies using virtual research methodologies.

*Keywords:* instructional design, authentic learning environment, situated learning, constructivism, learner-centered, Second Life, virtual world, 3-D virtual world, multi-user virtual environment, MUVE, massively multi-user online role playing games, MMORPG, Millennials, net generation, media studies, case study, social research

## **AUTOBIOGRAPHICAL STATEMENT**

Marija Franetovic is a Ph.D. graduate of Instructional Technology from Wayne State University, where she also earned her M.Ed. in Instructional Technology in 2004. She completed her B.S. at the University of Michigan in 1995 double majoring in Cellular, Molecular and Developmental Biology and Art History.

She works as a Course Developer and New Media Specialist at Lawrence Technological University. She has over twelve years of professional consulting experience in instructional design and new media integration. Her research interests include authentic learning environments, instructional design within virtual worlds and online games, and critical mass communication studies in relation to cognition and new media.

### **Related Publications and Presentations**

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