CONSTRUCTING THE NEW CLASSROOM: COLLEGE STUDENT PERCEPTIONS OF CLASSES USING SECOND LIFE

By

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To my family, for their constant support of lifelong learning

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The purpose of this study was to identify constructivist concepts that were important to student-perceived learning outcomes in college courses that use Second Life as an educational tool. Identification of these concepts will help instructors to make the best use of their course design efforts in mediated environments. Subsequently, this will benefit students by matching the learning environment to students' learning needs and potential preferences.

This study used a web-based survey to gather responses from 648 college students who used Second Life as a component in one of their current courses. The survey asked the respondents to give their perceptions of how their experience in the class represented the constructivist learning concepts of student responsibility and initiative, authentic learning context, co-operative support, and presence. Their responses were then compared to how they felt about several different learning outcomes. The respondents were also asked to answer open-ended questions regarding the modes of assessment and learning strategies in their class in order to gain a better understanding of two other important constructivist concepts: authentic assessment and generative learning strategies.

The results of this study indicate that authentic learning context and presence had the greatest positive effect on academic learning time, learning progress, student satisfaction, and quality of course and instructor. Instructors in mediated environments should design learning objectives and activities that are authentic to the world outside of the course, while also working to make sure students are comfortable interacting while in the learning environment. The responses to the open-ended questions provided greater insight into students' perceptions of the value of a variety of assessment forms and learning strategies and provided a basis from which further research into these concepts can begin. This is a valuable step in developing assessments forms and learning strategies that make the best use of all that virtual worlds have to offer education.

CHAPTER 1
INTRODUCTION

Web 2.0 offers new possibilities for the world of education. Technologies such as social networking, wikis, podcasts, and virtual worlds can provide valuable opportunities for participatory learning by moving students from the role of passive consumers to active contributors (Brown & Adler, 2008). Students who are part of the Net Generation, born after 1980, are quite different from older generations of students, especially in the areas of information processing and communication. They are more fluent in new technologies, want information quickly, multi-task well, and use several communication channels to retrieve information and communicate (Oblinger & Oblinger, 2005). With 97% of teens between ages 12–17 playing computer, web, portable, or console games, students are reaching a level where they may be more comfortable in virtual worlds than sitting in a classroom (Lenhart et al., 2008; Preimesberger, 2008). Recent exploration into Web 2.0 technologies' potential for educational value has brought virtual worlds, specifically Second Life, into the discussion of new methods for teaching.

Second Life was not created specifically for education, but its user-generated nature allows it to be adopted for many purposes. Recent research reveals that instructors have been using Second Life to teach across a variety of disciplines, including architecture, English as a second language, physics, law, science and space, computer science, and engineering (Calongne & Hiles, 2007). As of 2007, instructors who use Second Life come from more than 150 academic institutions and at least 14 countries (Cheal, 2007; Foster, 2007). The Second Life educator email list, maintained by Second Life creator Linden Lab, reaches more than 5,500 active subscribers (Miller, 2010).

This study examines students' use of virtual worlds through a constructivist lens, which is based on the idea that learning happens through experience. In order for students to maximize their learning, real-world examples should be used to give students the greatest chance to understand how learned concepts can be applied outside of an educational environment. This study also examines how social presence, the degree to which participants in computer-mediated communication feel affectively connected one to another, plays a role in student learning outcomes. Virtual worlds offer new opportunities for students to engage in learning through opportunities that may not be available or easy in the real world. One example of this is setting up a virtual business, which can be used to teach the basic skills necessary to run a real-life business. Kevin Werbach, an assistant professor of legal studies and business ethics at the University of Pennsylvania's Wharton School, points out the similarities of setting up a business in Second Life to that of the real world: "You have to have a core set of skills in defining an idea, implementing it, selling it, and managing the processes, which is really the essence of being an entrepreneur" (Foster, 2005, p. 2). Another example is setting up a virtual medical clinic where students can play the role of doctor, nurse, and patient to explore different strategies that may be effective in health care situations (Antonacci & Modaress, 2008). Each academic discipline can develop its own methods for using this technology in the way most pertinent to its desired learning outcomes. For example, a journalism class may send students out to interview a variety of sources in Second Life, giving the students an opportunity to gain valuable interviewing skills without leaving the classroom. A class studying television production may set up a

virtual studio, where students can learn the different aspects of production, and actually record virtual broadcasts.

Examining how the use of constructivist ideas and the effectiveness of establishing a sense of social presence relate to student perceptions of learning outcomes will help improve course design and subsequent learning outcomes in future courses that use virtual worlds as an instructional tool. Though several virtual worlds exist, this study will focus on the most popular virtual world in the realm of education, Second Life (Baker, Wentz, & Woods, 2009; Foster, 2007). The goal of this study is to fill several gaps that currently exist in virtual worlds' research providing a better understanding of the role constructivism plays in this new educational technology, how effective students perceive virtual worlds to be as educational tools, and to explore which forms of assessment and learning strategies are used and preferred by students.

Origins of Virtual Worlds

Second Life and other programs that fall into the categories of massively multiplayer online games (MMOs), multi-user virtual environments (MUVEs), and massively multiplayer online role playing games (MMORPGs) were made possible by vast improvements in Internet connections, graphics cards, and computing power (Delwiche, 2006). Virtual worlds come from a long line of virtual environments that trace their roots to early text adventure games of the late 1970s. Games like Colossal Cave Adventure and Dungeon, later sold as the Zork series, provided a textually described space for a single user to navigate using textual commands (Slator et al., 2007).

Multi-user Dungeons (MUDs)

Roy Trubshaw and Richard Bartle took the next step to the multi-user level when they created Multi-user Dungeon, or MUD, which allowed users to access a shared

database as part of the game (Bartle, 1990). The next innovation came when users were allowed to alter the game environment in MONSTER. These user-generated changes were made available to all other users who accessed the game through an online connection (Slator et al., 2007). Giving the power to alter the environment to the user marked a huge step toward collaborative environments such as Second Life, in which users constantly manipulate the appearance of the environment.

As computing powers progressed in the 1980s, new advances in multi-user environments became possible. Foremost among these was the appearance of graphical environments such as the first graphical MUD, called HABITAT. This type of multi-user world included 2D comic book style graphics and was seen as the direct precursor to MMORPGs, such as World of Warcraft and Everquest.

Better, cheaper computer hardware and faster online connections allowed more people to join multi-user environments. Many were enticed by the social aspect of these environments with some finding it easier to socialize in such an environment due to personal anonymity (Curtis, 1996). Some were drawn to the potential power they could wield through acts such as manipulating content created by others or removing users from the MUD itself. Whatever the reason, a large number of people were attracted to this mostly free and readily available technology. The remarkably high interest led to greater development of multi-user environments (Slator et al., 2007). As development progressed, MUDs began to look more like the virtual environments we know today.

Early MUDs came in two basic forms: adventure-oriented and social-oriented. The adventure-oriented MUDs focused on navigation through a text-based environment in a game-like structure where users could battle each other for points. Social MUDs, such

as the earliest social MUD, TinyMUD, established a cooperative environment where users were encouraged to build up and explore the multi-user environment as well as interact with other users (Slator et al., 2007). The building in these early MUDs did not allow the users to build items from scratch, but instead was limited to a pre-existing selection of items. In order to create an environment in which the users would have more control over the textual appearance of the environment, Pavel Curtis reconfigured a programming tool called MUD object-oriented (MOO). Curtis' new version, LambdaMOO, opened up multi-user environments to a broader range of computing systems allowing for a larger group of users to participate. Meeting online became easier for the average computer user and provided a virtual space that could be transformed into a multi-purpose space such as a classroom. As computer hardware and Internet connections improved, new virtual worlds began to form in the 1990s and early 2000s. Among the new virtual worlds, Second Life emerged as one of the most popular.

Origins of Second Life

Second Life is the product of Linden Lab, a San Francisco based company (Kirkpatrick, 2007) founded in 1999 by CEO Phillip Rosedale and comprised of 200 employees worldwide (Linden Lab, 2008). Second Life was released for public use in 2003 and quickly became one of the leaders in virtual world technology (Appel, 2006). Much like The Sims Online, Second Life is a free, 3D virtual environment, which allows users to explore and create objects online (Clark, 2008). What separates Second Life from its predecessors such as The Sims Online, Everquest, and World of Warcraft is that it is not a game (Appel, 2006). It is a virtual world created entirely by its 13 million registered residents (Antonacci & Modaress, 2005). These residents appear in Second

Life as customizable virtual personas called avatars, which have the ability to walk, fly, and teleport to various destinations within the virtual world (Appel, 2006). Through interaction among avatars, many aspects of the real world have developed in Second Life, such as unique language, political structures, shared history, and social rituals (Steinkueler, 2004).

It is important to distinguish Second Life from its virtual cousin, massively multiplayer online role playing games (MMORPGs), and games in general, even though virtual worlds and many online games share a great deal of similarities. Though some of the literature refers to Second Life as another MMORPG, Cory Ondrejka (2008) of Linden Lab points out that whereas MMORPG players work through content constructed by the game developers, residents of virtual worlds work together to create their own environment. MMORPGs, on the other hand, focus more on progressing through levels, gathering points, and navigating pre-constructed fictions. MMORPGs fall closer to Salen and Zimmerman's definition of a game as "a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome" (Salen & Zimmerman, p. 80). Second Life and other similar virtual worlds do not look to quantifiable outcomes like amassing points or opening new levels, and instead, are defined by the "ability of residents to generate creations of value within a shared, simulated, 3D space" (Ondrejka, 2008, p. 231). An important part of the co-creation process is the peer-to-peer teaching that takes place as virtual world residents negotiate the virtual world construction tools. Though collaboration certainly exists in MMORPGs, it is not as central to the user experience as it is in virtual worlds.

Second Life's digital presence consists of a multitude of islands, which can be broken up, to be bought and sold by residents. On this virtual land, avatars, the virtual representations of users, are free to explore, build, edit, and create objects and services such as skyscrapers, nightclubs, clothing, automobiles, and programming (Au, 2008). The year 2007 marked a major change for Second Life as Linden Lab released its software code to the public. This made Second Life an open-source program, which could be modified by programmers who could effectively use the Linden programming language (Au, 2008).

The creation aspect of Second Life allows for exploration of places or objects that may be hard to explore or not available in the real world. Examples include a recreation of the Sistine Chapel, a representation of Dante's Inferno, a town constructed to look like Elizabethan England, or a journey into the center of a hurricane (Foster, 2007; Galagan, 2008; Graves, 2008). The program's 3D visualization offers users the opportunity to experience many things that would be difficult to recreate in classrooms (Calongne & Hiles, 2008).

Second Life as an educational tool is still in an evolutionary phase and faces criticism and skepticism. While some educators and users praise Second Life's effectiveness in conducting group events, role-playing scenarios, and virtually exploring new places (Cheal, 2007; Childress & Braswell, 2006; Conklin 2007), some critics argue that virtual worlds are a better place for play rather than learning (Foster, 2007). Anthes (2007) suggests that the learning curve for Second Life may be too steep and that technical problems with the programming may be a barrier to effective teaching. "Griefing," the process through which avatars' users disrupt Second Life activity, is a

problem that instructors must consider before teaching in Second Life. By limiting access to their area, instructors can cut down on the chances that griefing will occur during instruction. A notable example of griefing took place in May 2007, shortly after shootings on the Virginia Tech campus, when an avatar shot several visitors on Ohio University's Second Life virtual campus. The University was forced to close its Second Life island temporarily to stop the virtual gunman (Graves, 2008). There are also worries about institutional liability related to griefing and how a university should respond to griefing incidents, given that such incidents happen in a virtual environment and there is little precedent in these cases (Bugeja, 2007). The negative issues of Second Life must be carefully considered, especially within the context of adopting it as an educational tool.

Purpose of Study

This study aims to measure Second Life's effectiveness as a constructivist tool in higher education. This study is one of the first to contain a quantitative analysis of students' perspectives on Second Life's use as an educational tool. The focus on student perspectives is important because it allows for a better understanding of how instructor performance and course design lead to deeper and more sustained learning. As K. Patricia Cross (1998) points out, "students and their learning should become the focus of everything we do. From the instruction that we provide, to the intellectual climate that we create, to the policy decisions that we make" (p. 2). Most of the previous literature has focused on the instructor's role in implementing this technology as opposed to how the students view this technology.

In order to effectively assess the constructivist content of classes that use Second Life, scales from the Distance Education Learning Environment Survey

(DELES) were used to measure three of Grabinger and Dunlap's (2000) five constructivist principles of rich environments for active learning. The three principles explored through the survey method are student responsibility and initiative, authentic learning contexts, and co-operative support. The fourth principle, authentic assessment, has not been a prevalent theme found among instructors' perceptions of Second Life (Neely, Bowers, & Ragas, 2009) and deserves more exploratory research to find out its application. Yee and Hargis (2010) point to assessment in virtual worlds as one of the principles most in need of research. The fifth principle, generative learning strategies, also needs further exploration as the research so far does little to illuminate what strategies are being used in virtual learning environments at this point. These latter two principles were addressed through open-ended questions to find examples of assessment and learning strategies that can be explored in future research.

Aside from the constructivist principles discussed above, Warburton and Perez-Garcia (2009) identified several ways in which Second Life can improve pedagogical innovations in the classroom context. These components were established through an extensive review of virtual world literature and, for the most part, coincide with Grabinger and Dunlap's list. One component of Warburton and Perez-Garcia's list that does not directly reflect the Grabinger and Dunlap set of principles is immersion. Immersion, measured through the user's sense of presence in an environment, has been an extensively researched topic in virtual reality and the field of computer science over the last few years. Immersion is an appropriate element to include in a study of student and instructor perceptions of a virtual environment as an instructional tool as it

may impact “the affective, empathic, and motivational aspects of the experience” (Warburton & Perez-Garcia, 2009).

Through measurement of constructivist components used in virtual worlds, this study attempts to provide a better understanding of the usefulness of virtual worlds, specifically Second Life, in an educational environment. This particular study differs from most of the current research available in the area of virtual worlds as learning environments because it looks at the student perspective as well as the instructor perspective. The results should prove useful in providing instructors with a better idea of which constructivist principles are most effective in the implementation of virtual worlds in the realm of higher education as well as show its true potential for diffusion among students and instructors. This study looks to fill current gaps in the literature by addressing student perception of Second Life’s effectiveness as an instructional tool as well as identifying both successful and unsuccessful use of constructivist components through Second Life instruction.

CHAPTER 2
LITERATURE REVIEW

Incorporating technology into the curriculum has been a constant challenge faced by higher education instructors. There has been a major influx of new digital technologies available to higher educators in recent years and the effects of many of these new forms of information technology have been positive. One study found that redesigning courses to include instructional technologies produced greater learning across a variety of learning outcome measures reported by both students and instructors, including increased course completion rates, improved retention, better student attitudes toward the subject matter, and increased student satisfaction with the mode of instruction (Twigg, 2003). Other studies have reported improvement in general education, personal development, and intellectual development among students that used instructional technologies (Hu & Kuh, 2001; Kuh & Hu, 2001; Kuh & Vesper, 2001). Some predict that networked virtual environments, like Second Life, represent the next step in learning settings (Foreman, 2003). This is a new development that the educational system must examine along with other educational information technologies, such as blogs, wikis, social networking, and podcasts. Educators need to consider the possible changes in policy and practice that may be warranted when working with technologically savvy students (Kennedy et al., 2006; Sharpe, Benfield, Lessner, & DiCicco, 2005).

A central theme throughout much of the literature regarding the use of technology to improve pedagogy is not whether instructors are implementing technology in their classrooms, but how they are using it. Wheeler (2001) points out that incorporating networked information technologies into instruction creates greater

efficiency in the educational process through improved access to course materials, better communication, sharing of resources and work spaces, and easier management of student information. Wheeler argues, however, that this is a limited view of the potential of these tools. Networked information technologies can also move education toward more non-linear cognitive strategies for problem-solving, representation, and storage and retrieval that better match the ways in which humans process information. There is a temptation for students and teachers alike to gravitate toward technology in education because it seems progressive and “refreshingly different” (Ewing, 2000, p. 215). Instructors and students may be better served by using technologies that can best deliver the content of a particular course instead of choosing the most attractive technology. Technology offers opportunities not only in improving the efficiency of information transfer and organization in a course, but, more importantly, in opening up new ways of thinking that make use of all of the available tools to provide effective and creative learning strategies that provide the greatest educational benefit to students.

Students’ Use of Technology

Conole, de Laat, Dillon, and Darby (2008) established eight factors of change in the ways that today’s students use the technological tools available to them, such as search tools, social networking, wikis, and blogs. Conole et al. suggest these factors may be useful for institutions and instructors to consider when making changes in their policies regarding integration of technology into their courses. These eight factors are discussed in more detail below.

Technology has become more *pervasive* and *personalized* as students have found various uses for technology across all areas of study. Access to multiple technologies is important to the modern student who looks beyond traditional texts for other forms of

information and moves quickly between them. Technologies that are *niche* or *adaptive* provide the best options for them. Students have also integrated technology into their social habits. This allows for communication among peers in relation to course work and leads to collaboration of skills and resources (Conole et al., 2008). Virtual worlds may be adapted by the user to reflect various areas of study as seen in the multiple disciplines already using it for instructional purposes (Calongne & Hiles, 2007). Second Life is also improving its functionality with outside applications and Web sites that may provide for uses more pertinent to the individual user (Warburton and Perez Garcia, 2009).

Students have become used to ease in usability of technology and expect their courses, as well as the tools necessary to complete their course work, to be just as well *organized*. Lack of course organization does not take full advantage of the technological sophistication of today's student and may prove frustrating to students when they are forced to spend more time searching for information than they are used to (Conole et al., 2008).

Individual technologies may have several purposes. Students are finding many technological skills *transferable*. Some technology they use for social purposes may prove useful to them when applied to their course work and vice versa. Students are looking to get the most use out of those technologies with which they are most comfortable (Conole et al., 2008).

Modern students have also developed new ideas on *time and space boundaries*. The speed of communication changes students' expectations in terms of response time. They expect their friends, as well as their instructors, to respond to their electronic

communications much more quickly than they would traditional methods. Modern students are also used to changing surroundings. They want technology they can access from many locales and are adept at multitasking. Their digital environment allows them to use many tools, often at the same time (Conole et al., 2008).

The amount of tools available to today's student has changed students' *working patterns.* The complex web these technologies weave requires evaluation and synthesis to effectively manage. The end result is a technologically savvy student who uses information in unique ways that make sense to their individual personalities and needs. These working patterns take advantage of information tools that can be *integrated,* and allow for information to work across platforms. (Conole et al, 2008).

Virtual worlds offer valuable opportunities to address these factors. The nature of the virtual environment leaves it open for change, allowing students and instructors to adjust the environment to fit the many needs outlined above. Concurrently, instructors may wish to incorporate other technologies (web-pages, social media, blogs, etc.) to help negotiate these factors. It is clear from the list above that students have certain expectations of how technology should work in their courses. Instructors must keep these expectations in mind when deciding what technologies are appropriate for their specific courses. Instructors may be best served by considering technology as one of the many tools available to them. When technology shows potential to improve learning, teachers may look to implement technology into their curriculum. When traditional methods such as lectures, papers, and pencil and paper tests are more appropriate, they should be used in order to provide the best benefit for the student (Delwiche, 2006).

Second Life provides a place where several processes already being used in online learning can be combined within the virtual world itself, such as assigning projects or encouraging collaboration. In some cases Second Life may be unable to incorporate certain learning technologies, like blogs, wikis, or social networking in-world. Those technologies may be used outside of the virtual world as a supplement to the Second Life component of the course. A benefit of Second Life functioning in a similar way to online courses comes in the use of synchronous or asynchronous tools in situations that take the most advantage of the positive aspects of each these forms of communication (Repman, Zinskie, & Carlson, 2005). Asynchronous tools such as email, discussion boards, listservs, and blogs give students the opportunity to complete work outside the live setting of a class. Synchronous tools, on the other hand, make many of the benefits of a traditional class available to classes that take place online. Synchronous tools include online chat, instant messaging, and audio and Web-based video conferencing, functions that are available in the Second Life platform. This may make for a smooth transition from online classes to the virtual world environment.

One example of using both the asynchronous and synchronous aspects of Second Life is Childress and Brasswell's (2006) integration of Second Life into an online graduate-level Foundations of Instruction Technology course. In this course, the instructors used several different methods to increase communication and collaboration among the online students. One activity, called Think/Pair/Share, began with the instructor sending a question by email, Web site, or through the learning management system. The students thought about the question on their own, then met in the virtual world in real time with a partner to come up with a joint answer. The partners then

presented their answers to the class in the virtual environment, using PowerPoint, supplemental documents, images, and Web sites. Another technique Childress and Brasswell (2006) used is called round robin/round table. In this activity, students met virtually in small groups and discussed a question posed by the instructor. A student recorder was assigned to take notes and, subsequently, relate the information to the rest of the class. These are just a few examples of some of the ways virtual worlds can use different forms of communication to build a stronger relationship between students and with the instructor.

Bannan-Ritland (2002) conducted a meta-analysis of 132 conceptual and primary research journal articles that addressed interactivity and presented several findings to consider when moving from a traditional class to an online or virtual world class. First, instructors should consider asynchronous and synchronous tools as offering different approaches to interactivity. Second, co-operative or collaborative activities can be used to foster interactivity, while course structure, class size, feedback, and experience are all factors that influence interactivity. Finally, the instructor plays a significant role in modeling interactivity and successful use of interactive elements requires the instructor to adjust instruction techniques from face-to-face contexts to those appropriate for the available interactivity level in virtual worlds.

With heavy time demands on faculty, instructors may have little opportunity to expand their knowledge of various forms of new media. As students come to expect more technology options in their classes, however, instructors will need to adjust (Kagima & Hausafus 2000). The more technologically integrated higher education becomes, the more comfortable faculty will need to be with technology because

computer self-efficacy plays a large role in incorporating electronic communication into teaching (Kagima & Hausafus, 2000). Though learning and maintaining the virtual presence for educational purposes can be a time-consuming process, 94 percent of instructors in a recent survey said they would use Second Life again (Bowers, Ragas, and Neely, 2009). This suggests that the benefit to the students outweighed the time it took to maintain the presence. As more instructors use Second Life for educational purposes, better tips for instructors to bypass several barriers will be developed, and a network of instructors can be built to provide assistance to each other.

Barriers to Using Virtual Worlds for Instructional Purposes

Warburton (2009) points out several categories of barriers compiled from newsgroups, blog posts, and existing literature that are common to the use of Second Life in the classroom. Though this list reflects the instructor's perspective, the effects can be seen on the student side. The barriers are technical, identity, culture, collaboration, time, economic, standards, and scaffolding presence and social discovery. These are important to consider in the discussion of using Second Life for education as sometimes barriers can outweigh benefits. These barriers are discussed in greater detail below:

1. **Technical***:* Technical issues, including hardware and bandwidth limitations, abound in Second Life and require the instructor to be capable of negotiating technical issues or have alternate activities ready when technical issues cannot be resolved. Instructors must also be aware of Second Life's steep learning curve. Students must acquire the basic skills of Second Life, like walking, flying and communicating, in order to successfully navigate the software. Instructors must carefully plan out how they will address students' learning of these skills and understand that students may become acclimated at different rates (Warburton, 2009). Technical issues must be carefully considered before adopting Second Life for instructional use as technical difficulties is the primary concern identified by those who have used Second Life as an instructional tool (Neely et al., 2009).

2. **Identity***:* The ability to play with identity is a unique component of Second Life. Warbuton and Perez-Garcia (2009) indicate that shifting identities can be problematic when trying to build social relations or when trying to make people accountable for actions that take place in the virtual world.

3. **Culture***:* There are many chances for Second Life users to interact with several cultures in Second Life through established groups or islands dedicated to specific cultures themselves. It is not always easy, however, to find, join, or participate in these other opportunities. Students who are not comfortable exploring or interacting with these new cultures may feel isolated and gain little from the Second Life experience.

4. **Collaboration***:* Collaboration in a virtual world may be new and strange to students. In many learning situations that require collaboration, students may be unwilling or resistant to interaction with virtual representations instead of real, physical people. Warburton and Perez-Garcia (2009) recommend scaffolding collaboration to slowly expose students to virtual world collaboration. Another option is to use social media that students may be more familiar with such as instant messaging, social networks, blogs or wikis concurrently with Second Life.

5. **Time***:* Instructors who wish to integrate Second Life into their courses must be aware of the time it takes to design and implement activities in Second Life. Multiple skills are needed to handle the many tools of Second Life. Better knowledge of these skills should lead to quicker navigation through the design and implementation process.

6. **Economic***:* Instructors must consider costs of buying land, purchasing objects and tools, and uploading materials when using Second Life for instruction. Though creating and using an avatar is free, many of the things instructors will need to successfully conduct a course in a virtual world cost money, such as buying and maintaining land or purchasing objects to fill the environment. This can be a major concern for those with little or no institutional support, who may be funding the Second Life component of their course from their own pocket (Neely et al., 2009).

7. **Standards***:* Lack of standards and the inability to transfer many things in and out of Second Life or to another virtual platform can be a major problem for those who wish to integrate several technologies into a class that uses Second Life. Instructors must consider the technologies they want to use in the course (Power Points, learning management systems, 3D objects from other programs) and what this may mean in terms of time and cost due to lack of interoperability between technologies.

8. **Scaffolding persistence and social discovery***:* Second Life offers limited social networking capabilities when compared to established social networks like Facebook or LinkedIn. Students may be frustrated with the lack of social tools they are used to and instructors must be prepared for that. Some web-based sites, like Flickr, are working on creating connections to Second Life so that avatars may

show their in-world pictures and constructions on sites outside Second Life. This kind of connection may allow for greater persistence between in and out-of-world experiences (Warburton and Perez-Garcia, 2009).

Though several barriers to the successful use of Second Life exist, better understanding of its uses and cooperation among potential users may help instructors negotiate these barriers. The potential for Second Life to improve learning through the use of appropriate constructivist methods may prove to outweigh the time and effort necessary to work through the various barriers.

Constructivism

Constructivism is a broad theory with roots in philosophy but with application to several different disciplines, such as education, psychology, and mass communications. In this study, the term represents the learning theory form of constructivism. One of the central ideas of constructivism is that the best learning happens through experience and not by attempting to transfer ideas from an instructor or a book that provides little context to the learner. Learners come into contact with ideas through many different kinds of experiences and in different environments. In order to understand the idea and to be able to apply it later, the experience in which the idea is a part needs to be examined (Jonassen, 1992). Many researchers find that the experiences used to teach ideas in school systems are vastly different than the ways those ideas are used in the real world (Brown, Collins and Duguid 1989; Resnick, 1987; Sherwood, Kinzer, Hasselbring, and Bransford, 1987). These studies found that the disconnect between experiences in the classroom and experiences in the real world may lead to the inability to transfer knowledge between the two.

Resnick (1987) points out that learning that takes place in school differs from real world learning in four main ways, according to her analysis of previous research.

Resnick emphasizes that learning in school focuses on the individual, and even though group activities occur in the school setting, students are ultimately assessed at the individual level. This differs from the real world, where activities are socially shared, whether at work, in personal life or during recreational activities. Next, Resnick explains that work inside school is based mostly on the concept of “pure thought” while activities outside school focuses more on the manipulation of tools. Learning outside of school is also more focused on making connections to real people or events, according to Resnick. In contrast, school learning places higher value on symbols, which may not translate to real world knowledge. Finally, Resnick points to school learning as using more general knowledge than the situation-specific knowledge that is used in the real world. Students may find it difficult to apply general knowledge to situations in real life, making that general knowledge essentially useless (Resnick, 1987). Constructivists suggest placing learning in the context of authentic activities in order to encourage the transfer to real world application (Brown et al., 1989).

According to Piaget (1963), the mind stores the information learned through various experiences into a complex set of cognitive structures. The more the individual experiences, the more complex these cognitive structures become. When the individual’s cognitive structures come into conflict with experiences they have in reality, the individual either assimilates the knowledge of the experience into a new cognitive structure or accommodates the new idea by adjusting existing structures. This is done so that the individual may return to a state of cognitive ability that Piaget refers to as equilibrium. This concept of resolving discrepancies between perception and reality is

one of the main processes a person's mind goes through in constructing an individual perspective of the world around it (Piaget, 1963).

In order to encourage student interest in attaining knowledge, constructivists maintain that problems given to the student should be relevant to the student. The challenge for constructivist instructors is to create a learning environment in which students will be interested, leading to student initiative in exploring and thinking about the ideas presented in that environment (Brooks & Brooks, 1993). Various forms of educational technology, including virtual worlds, give instructors new ways of preparing the learning environment that may be more relevant to students and encourage exploration of ideas presented in the class.

Constructivism and Educational Technology

Many scholars have used constructivism as a solid theoretical foundation for their research into the effectiveness of various educational technology applications. Tam (2000) notes that the versatility of computer technology offers an opportunity to shift the focus of learning away from possessing knowledge and toward constructing knowledge. Juniu (2006) argues that while new technologies have provided unique possibilities for the development and delivery of instructional materials, too often these technologies are used only as "productivity tools to disseminate knowledge through lectures, drill and practice, and tutorials" (p. 69). In contrast, constructivist applications of technology promote student-centered learning with real-world relevance by offering opportunities for interactivity, collaboration, critical thinking, problem-solving, and original creations (Juniu, 2006).

The emergence of new technologies such as multimedia, the Internet, hyperreality, and virtual reality allows for active, experiential construction of meaning

(Karagiorgi & Symeou, 2005). Su (2007) found that the implementation of the constructivist multimedia environment in college science courses improved students' scientific knowledge and performance and promoted a more positive attitude toward science as measured by pretests and posttests of knowledge and a questionnaire assessing student attitudes. The addition of computer animation to help students visualize scientific processes, with deliberate attention to constructivist goals, was shown to improve students' abilities to grasp complex concepts and provided more opportunities for students of varying levels of scientific aptitude to succeed.

Rich Environments for Active Learning

The basis for constructivism lies in the idea that learning consists of building, interpreting, and modifying how reality is constructed in the mind of the individual through the various experiences the individual has (Jonassen, 1994). Grabinger and Dunlap (2000) use this basis to discuss the design of what they call Rich Environments for Active Learning (REALs). They define REALs as "comprehensive instructional systems that

- evolve from and are consistent with constructivist philosophies and theories;
- promote study and investigation within authentic (i.e., realistic, meaningful, relevant, complex, and information-rich) contexts;
- encourage the growth of student responsibility, initiative, decision making, and intentional learning;
- cultivate an atmosphere of knowledge building learning communities that utilize collaborative learning among students and teachers (Collins, 1995);
- utilize dynamic, interdisciplinary, generative learning activities that promote high level thinking processes (i.e., analysis, synthesis, problem solving, experimentation, creativity, and examination of topics from multiple perspectives) to help students integrate new knowledge with old knowledge and thereby create rich and complex knowledge structures; and,

- assess student progress in content and learning-to-learn through realistic tasks and performances." (Grabinger & Dunlap, 2000 p.15)

Grabinger and Dunlap (2000) specify three main characteristics of constructivism that play a part in the development of REALs. The first characteristic is that knowledge is a process and not a product. Knowledge comes out of the individual's attempts to understand reality (Grabinger & Dunlap, 2000; Gurney, 1989). It is through this process that learners develop a sense of ownership for their ideas, which makes those ideas less likely to degenerate over time (Jonassen, 1996).

The second characteristic is contextualization of knowledge. In order for knowledge to be useful to the individual, it must be placed within the proper context for recall later. Failure to do so results in knowledge that seems irrelevant to the individual and is not brought to mind when the individual faces a challenge in which the knowledge may be useful (Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990; Grabinger & Dunlap, 2000). Brown, Collins, and Duguid (1989) specify a process called *indexicalizing knowledge*. This process involves "indexing" knowledge in such a way that it may quickly be linked to new situations that arise where application of that knowledge is appropriate. Proper contextualization of knowledge is another important piece of making knowledge accessible to the learner for future use.

Finally, the third characteristic of constructivism that is a part of REALs is the use of collaborative efforts within the learning process. Constructivists often refer to this process as social negotiation of meaning. This collaboration process helps to keep construction of knowledge from becoming intellectual chaos by checking the construction of representations against the representations of others (Jonassen, 1996). Grabinger and Dunlap (2000) suggest that there are five critical principles of a "rich

environment for active learning" (REALs) that support a constructivist educational view (p. 8). These characteristics, when applied to a virtual world setting, may lead to more student involvement through the application of constructivist principles.

Student responsibility and initiative

The first principle is *student responsibility and initiative*, which is characterized by intentional learning, questioning, self-reflection, and adjustment of metacognitive skills. Improvement in this aspect of teaching may help students develop the skills to become lifelong learners. According to Hirumi (2002), the goal of instruction in a student-centered, technology-rich learning environment, which is similar to REALs, is to "(a) enhance learner's ability to search for, access, retrieve, interpret, synthesize, organize, transfer, and communicate information; and (b) promote the development of metacognitive strategies and self-regulatory skills associated with life-long learning" (p. 500).

The first attribute of the student responsibility and initiative principle, intentional learning, addresses some of the negative characteristics that passive learners often pick up in conventional learning environments. These characteristics leave learners with knowledge that cannot be adequately applied to real life situations (Grabinger & Dunlap, 2000). First, passive learners tend to be less focused on goals than on the topics themselves, and this leaves them with little context for their knowledge and makes the knowledge attained seem irrelevant to everyday life. Second, passive learners fail to explore subjects in-depth, giving them knowledge based only on the surface features of a topic that is an incomplete understanding. Third, passive learners focus on finishing a task without considering how they could improve their work or how they used strategies that may help them in future problems. Finally, they look at learning as an additive

process instead of addressing how they could use their existing knowledge to incorporate and better contextualize new concepts (Scardamalia, Bereiter, McLean, Swallow, & Woodruff, 1989).

Strategies to address student responsibility and initiative. In order to address passive learning, instructors may find that getting students to ask questions increases their sense of involvement in the learning process. Asking questions allows instructors and students to more effectively navigate the process of knowledge acquisition through addressing individual gaps in knowledge structure. Questioning also results in a greater feeling of ownership of knowledge, making the knowledge more useful in the future (Scardamalia & Bereiter, 1991).

Another way to move learners from passive to active participant status in terms of student responsibility and initiative is to encourage self-reflection of the learning process. Through this process, students give greater consideration to their role in the learning process and how their actions affect their problem-solving skills and their ever-changing knowledge structures. Through the self-reflection process, learners can begin to understand how to adjust their metacognitive strategies to better tailor their strategies to their unique learning styles as well as to changing sets of problems to be navigated. This allows students to consider what steps may work for them in dealing with similar problems in the future as well as allowing them to look at alternative steps that may prove fruitful in future situations (Von Wright, 1992).

One way to encourage student responsibility and initiative is through the use of a teaching strategy developed by Palincsar and Klenk (1992) called reciprocal learning. Reciprocal learning uses the strategies of questioning, summarizing, clarifying and

predicting to facilitate greater student involvement in the learning process. This takes advantage of the constructivist concept of the zone of proximal development posited by Vygotsky (1978), which he described as:

> the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers (p. 86).

Presenting students with problems that they cannot solve by themselves but can work through with the help of peers and instructors pushes students to explore beyond their individual limitation and encourages greater responsibility on the student end of the learning process (Grabinger & Dunlap, 2000).

Neely, Bowers, and Ragas (2009) found student responsibility and initiative to be a prominent theme among higher education instructors using Second Life as an instructional tool. Instructors commented that Second Life offered students a chance to role-play and create their own content. Specifically some instructors praised Second Life as a “a whole world to explore and interact with,” and that “it has a potential lost to mass education, the ability to stimulate a creative intelligence and transform students” (Neely et al., 2009, p.12). These responses indicate the potential Second Life has to move students from passive to active participants in the learning process. Another instructor responded, “There is more room for ‘creative experiment’ for the students; it provides a fascinating juxtaposition with ‘normal’ and institutional classroom conventions” (Neely et al., 2009, p.13). Responses such as these indicate that some instructors are finding Second Life to be an improvement over traditional education in encouraging creativity and experimentation in students and allowing them to exert greater control over their own learning.

Assessing student responsibility and initiative. In order to measure student responsibility and initiative in this study, two scales from the Distance Education Learning Environment Survey (DELES) were used: active learning and student autonomy. This survey was developed by Scott L. Walker and Barry J. Fraser (2005). Walker and Fraser came up with this survey by reviewing key literature on learning environments and distance education. Once a new instrument was established, it was reviewed by a panel of experts, which led to a final version of scales to be used. Items were then written for each of these scales and then field tested for validity and reliability (Walker & Fraser, 2005).

The active learning and student autonomy scales address the concept of intentional learning, showing that students perceive that they are going through the processes necessary for learning themselves. These scales also reflect the students' development of the metacognitive skills that are a part of life-long learning. Namely, these scales identify students who feel they have a great deal of control over their learning and can continue to learn outside the class.

Generative learning strategies

The second principle of REALs is the implementation of *generative learning strategies* in which students are actively involved and use tools to build work products that foster a rich understanding of the world (Grabinger and Dunlap, 2000). According to M.C. Wittrock (1974), learning should not be seen as a passive transfer of information from the instructor to the learner. The instructor should focus more on the active role the individual plays in the learning process.

Implementing generative learning strategies. Grabinger and Dunlap (2000) suggest a strategy of *cognitive apprenticeship* to put generative learning strategies into

action. Through this process, instructors pass on knowledge by showing the learner how to work through a task, then gradually move from a position of coaching the learner to the role of an observer as the learner gains greater mastery over the task (Collins et al., 1991). Through this process, the learning becomes more visible to the learner, especially when a product through which they observe the fruits of the process is produced. (Grabinger & Dunlap, 2000). Merrill (2002) points out the importance of using skills learned in an active way through his fourth principle, “Learning is promoted when learners are required to use their new knowledge or skills to solve problems (p. 49).” This advocates the use of more real-world tasks to help students practically apply the knowledge picked up during the course.

Virtual worlds represent a new way of approaching generative learning strategies. Virtual worlds give users the ability to construct artifacts using tools made available to them through the software (Franceschi, Lee, Zanakis, & Hinds, 2009). Barab, Hay, Barnett, and Keating (2000) found significant gains in conceptual knowledge when a 3D solar system modeling component was implemented in an undergraduate introductory astronomy course. Specifically, they found this generative learning strategy “to be particularly effective in supporting student learning in two fundamental ways: (1) allowing students to change frames of reference, and (2) supporting students’ ability to visualize abstract concepts” (Barab et al., 2000, p. 748).

Assessing generative learning strategies. More research into what types of learning strategies are being used in virtual worlds is needed. Currently, no scale exists to measure generative learning strategies. This study used open-ended questions to get a better sense of what learning strategies are being used in virtual learning

environments. This should give education researchers a better idea about how to approach learning strategies in virtual environments and may lead to the development of a scale to measure whether learning strategies are generative in nature.

Authentic learning context

The third principle of REALs is an *authentic learning context*, which makes learning experiences as realistic as possible while taking into account students' age, maturity, and environmental constraints such as safety and available resources. Grabinger (2000) points out three main reasons for using authentic learning contexts in REALs. The first lies in the consideration that realistic learning situations are more meaningful to students, giving them greater ownership over the learning that occurs when navigating through a problem. Instructors often try to teach with methods specific to school culture and not the culture of the subject being studied. This can limit the students' ability to use the knowledge as practitioners would, which makes it difficult for the student to transfer the knowledge outside of the school context (Brown et al., 1989). The second reason is that authentic learning contexts lead to better use of knowledge in novel situations due to the improved development of knowledge structures in reaction to authentic situations. Third, complex realistic problems encourage collaboration among students and deeper levels of meaning negotiation.

Strategies to address authentic learning context. M. David Merrill (2002) developed a list of first principles of instruction through evaluation of several design theories and models. The first principle reflects the authentic learning context principle through the statement, "Learning is promoted when learners are engaged in solving real-world problems" (p. 44). Jonassen (1999) points out that a problem must be interesting, relevant, and engaging for a student to take ownership of it. Merrill (2002)

goes on to say that too many courses are topic-centered and not problem-centered, which requires students to learn a great deal about a topic before ever seeing a real application of it. He, along with several other researchers (Collins, et al., 1989; Gibbons, Bunderson, Olsen & Robertson, 1995; Perkins & Unger, 1999; Reigeluth, 1999; van Merrienboer, 1997), instead advocates the use of problem progression. This allows students to move from less complex to more complex problems as their skills improve.

Virtual worlds offer an opportunity for students to connect education and experience (Barab et al., 2005). Situations confronted in the virtual world environment have the potential to reflect real-life situations. Students who develop the skills to understand and negotiate the virtual world version of the problem may then transfer those skills to similar problems faced in the real world (De Castell & Jensen, 2007). The ability to manipulate the environment in Second Life offers a lot of potential to create authentic learning situations. Students who are able to immerse themselves in the content may find it easier to transfer the skills they pick up back into the real world, leading to deeper connections to the content and concepts presented (Coffman & Klinger, 2007). Students who took part in an interdisciplinary course that used Second Life to build virtual versions of low-income housing found that “SL offered them some atypical ways of learning such as putting theoretical knowledge into practice in a safe, playful environment, allowing students to try out their plans or hypotheses by ‘doing’, and increasing the use of one’s own creativity by working in SL on a project that was grounded in the real world” (Jarmon, Traphagan, Mayrath, & Trivedi 2009, p. 174).

Assessing authentic learning context. In order to measure authentic learning context, this study used two scales from the DELES instrument: personal relevance and

authentic learning. These scales measure how closely students think the topics and activities relate to the real world. This is the essential piece of authentic learning context. The personal relevance and authentic learning scales from the DELES instrument provides a solid basis for assessing whether students feel the content presented in their course is authentic to them.

Authentic assessment

The fourth principle of REALs is *authentic assessment* to evaluate student performance. Traditional education relies on evaluative measures such as pencil and paper tests and written reports that are often inappropriate for the content, time consuming for the instructor, subjective in nature, and inaccurate in testing the ability of the learner in problem-solving situations (Frederiksen & Collins, 1989; Williams & Dodge, 1992). Wiggins (1989) discusses several criteria for authentic tests that can provide more accurate assessment of a learner's ability than traditional testing methods. Wiggins' ideas on testing methods include requiring students to contextualize knowledge, making test content explainable to students before the test, and using assessment measures that are diverse enough to appeal to different forms of intelligence (Grabinger & Dunlap, 2000).

Implementing authentic assessment. Using assessment measures aimed at a more comprehensive evaluation of student abilities can lead to better construction of learning situations on the side of the instructor, while further connecting the knowledge students have gained to realistic application of that knowledge. Well-constructed assessment measures provide a solid point of context that gives both instructors and learners a better idea of what skills have been developed and which skills deserve greater focus (Hirumi, 2002).

Assessing authentic assessment. Discussion of assessment practices in virtual worlds has been limited and an analysis of instructor responses to questions regarding the use of Second Life (Neely et al., 2009) in their classes showed that authentic assessment was the least discussed of Grabinger and Dunlap's principles. Yee and Hargis (2010) also point out that "One of the most severely lacking aspects of in-world teaching and learning is that at this point, there is very little assessment practices of any type; either for faculty to assess student learning, or just as importantly, assessment on how effective the mode of teaching in-world actually is for students" (p. 214). The importance of accurately assessing students calls for the consideration of proper techniques of assessment and may require new techniques that can be applied to virtual world assessment. Due to the lack of research in the area of assessment in virtual worlds, this study looks to the fill the gap by gaining a better idea of what assessment practices are out there and how effective they are in accurately assessing student learning through open-ended questions asking what assessment measures were used in their class and which ones the students preferred.

Co-operative support

The fifth and final principle of a rich environment for active learning is *co-operative support*, in which students work together and are responsible not only for their own learning, but that of their fellow students. This takes into account meaning negotiation and the construction of knowledge through social means (Roth, 1990). Collaboration offers students the chance to develop better knowledge structures through "argumentation, structured controversy, and the sharing and testing of ideas and perspectives" (Grabinger, Dunlap, and Duffield, 1997, p. 13).

Implementing co-operative support. One of the ways in which students can work together is through *cognitive apprenticeship* (Collins, Brown, & Newman, 1990). This approach usually focuses on the relationship between instructor and learner, but may be used in cases where there is an expert and a novice. The expert, in this case, provides the novice with a model of the process that is being taught and helps the novice through some of the steps of the process. The novice gains knowledge and becomes increasingly independent as the novice masters the skills the expert presents (Kafai & Harel, 1991).

Another form of collaboration is *peer collaboration* (Daiute & Dalton, 1989). The goal of this form is for the students to work together through instances of *cognitive conflict*, by which different ideas and perspectives are considered and tested by collaborators, resulting in knowledge construction through negotiation. Within this process, students may alternate between the roles of expert and novice depending on the situation confronted (Kafai & Harel, 1991). This differs from the cognitive apprenticeship where the expert remains the expert and the novice remains the novice throughout the learning situation.

The collaborative opportunities available in virtual worlds like Second Life are one of the most discussed advantages in the virtual world literature. Second Life has potential to improve both efficacy, as well as joy of learning, through its social focus (Johnson & Levine, 2008). Jarmon et al. (2009) found that implementing S[econd] L[ife] into an interdisciplinary class “revealed that students’ interdisciplinary communication awareness and knowledge increased through their experiences in Second Life in addition to their experiences in class. Particular types of learning found in these data

include general or interdisciplinary communication-specific awareness of one's own and others' perspectives and development and implementation of collaboration strategies with others" (p. 176). Neely et al. (2009) found responses from higher education instructors using Second Life that indicate the use of generative learning strategies. Responses included "venue for student projects," "build up a virtual classroom," "project-based learning," "designing 'thematic' environments," "we will make movies inworld," and "exhibition of art" (Neely et al., 2009, p. 13). Instructors focused mainly on the use of Second Life's building tools as a way for students to "engage with highly conceptual ideas that they could express visually" (Neely et al., 2009, p. 13). Responses like these indicate that instructors are making use of the visual nature of Second Life to encourage students to actively construct visual representation of their ideas.

Assessing cooperative support. In order to measure cooperative support, the student interaction and collaboration scale of the DELES instrument was used. This scale measures how much students perceive cooperation occurring with other students in their class.

Presence

Warburton and Perez-Garcia (2009) present a similar list to Grabinger and Dunlap's that focuses on ways in which virtual worlds, specifically Second Life, can help improve pedagogy. One added component present in Warburton and Perez-Garcia's list is immersion. Warburton (2009) discusses that a greater sense of presence in the environment "can impact the affective, empathic, and motivational aspects of the experience" (p. 421).

The concept of presence has been examined from many different perspectives including education, human computer interaction, psychology, mass communication and literature (Beck et al., 2009). Each field has developed the concept in ways pertinent to the specifics of that field, but with many similarities across the disciplines. The resultant definitions can be divided into two main types: non-sentient and sentient. Non-sentient refers to the sense of being present in an environment, while sentient presence focuses on the interaction with animate objects that appear to have feelings or intelligence (Beck et al., 2009). The use of presence in this study will focus on sentient presence, due to its association with the cooperative component of constructivist theory through the encouragement of interactions among students in a computer-mediated environment (Swan et al., 2008). However, educational research usually refers to this idea as social presence. Since this is the case, this study will follow that lead by using the social presence term with Swan et al.'s (2008) definition, "the degree to which participants in computer-mediated communication feel affectively connected one to another" (p. 2).

In educational research, studies have found that social presence varies based on the medium used and the participants involved (Moreno & Mayer, 2004; Wallace, 2003). Studies have found an increase in levels of spatial learning, vocabulary, listening skills, cultural sensitivity, enjoyment, involvement, task performance, and overall course satisfaction when increased levels of social presence are involved (Balakrishnan & Pierre, 2007; Gunwardena & Zittle, 1997; Lombard & Ditton, 1997; O'Brien & Levy, 2008; Romano & Brna, 2001; Tu, 2002). Tu (2002) cites social presence as the most important factor in distance education, and goes on to say, "social context, online communication and interactivity and online privacy are important factors in impacting

the level of social presence. The level of social presence is not only determined by the attributes of media (online communication) and users' perceptions (social context), but also the activities in which the users are engaged (interactivity)" (p. 43). Mikropoulos (2006) echoes this idea, claiming socialized virtual environments are important to students and should be the goal of instructors using virtual environments.

Presence may be a key consideration when looking to improve distance-learning environments as it allows for users to show their personalities, participate in concurrent activities and give and receive immediate feedback (Bregman & Haythornthwaite, 2003; Kapp & O'Driscoll, 2010) This encourages a genuine feeling of being together. Social interaction may be one of the most important experiences users can have in a virtual world (Aragon, 2003; Heeter, 1992; Lombard & Ditton, 1997). Dow (2008), whose data came from focus groups of students involved in online library and information science courses, found the social context portion of presence to be a vital part of the development of a strong sense of social presence. Students in the courses from which focus groups were drawn discussed the difficulty of communicating without really knowing the others who were involved in the class, indicating the need for greater socialization early in the learning process so the communication can flow more easily. Yoon (2003) points to the importance of social behaviors, claiming they make up 26.3 percent of all behaviors performed by virtual learning teams. When social presence is lacking, the environment is seen as impersonal and the amount of information being shared drops significantly (Leh, 2001).

Assessing presence. In order to measure social presence in this study, a validated scale from Swan et al. (2008) will be used. This scale is one of three that was

part of a survey instrument used to measure teaching, cognitive, and social presence in an online community. Since the current study focuses on social presence, only the items pertaining to that scale were used.

Presence, along with Grabinger and Dunlap's principles of rich environments for active learning, represents a positive aspect of virtual worlds that has the potential to improve learning. This study examined whether Grabinger and Dunlap's principles and social presence, played an important role in how students perceived learning outcomes. This analysis provides a better understanding of the constructivist potential of virtual environments and how possible-learning outcomes may be improved.

Assessing Student Learning Outcomes

To better understand the role Second Life plays in college students' learning, some assessment of the technology's effect on learning outcomes is necessary. Because students are at the center of their learning, this study asked the students for a subjective assessment of their own learning. Many studies show positive correlations between student self-reports and objective assessment measures in college courses, allowing for valid measures of student learning outcomes to be assessed through student self-reports (Cohen, 1981; Kulik, 2001). With this in mind, the results of the student's assessment will provide deeper insight into how inclusion of Second Life as an instructional tool in college curriculum affects student-learning outcomes in various disciplines.

Teaching and Learning Course Quality Evaluation (TALQ)

In order to measure student-learning outcomes in this study, part of the recently developed Teaching and Learning Course Quality Evaluation developed by Frick, Chada, Watson, Wang, and Green (2009) was used. This set of nine scales measure

student perceptions of academic learning time (ALT), learning progress, satisfaction, quality of course and instructor, authentic problems, activation, demonstration, and application. All items are statements requiring student responses to five-point Likert scales. Only the first four scales were used to determine student-learning outcomes in this study. These scales, ALT, learning progress, satisfaction, and quality of course and instructor provide a clear look at how effective the students think their class and instructors are. When compared to their rating of how the students thought their class reflected Grabinger's constructivist principles, the results present a clearer picture of how incorporation of constructivist principles affects the students' ratings of learning outcomes. The final five scales, based on Merrill's five first principles of instruction, are measuring concepts close to what is being measured through other scales in this study. This makes them inappropriate for inclusion in this study.

Academic Learning Time

Academic learning time (ALT) is useful in evaluating how much time students are spending successfully engaged in activities that work towards the course objectives (Berliner, 1991; Frick et al., 2009; Squires et al., 1983). As Berliner (1991) says, "instructional time allows for understanding, prediction, and control, thus making it a concept worthy of a great deal more attention than it is usually given in education and educational research (p. 4)." Berliner (1991) points out that ALT is related to the actual time students are engaged with learning materials that produce success in working towards learning objectives. Measuring ALT should provide deeper insight into how students are approaching their Second Life class outside of the specified class time.

Learning Progress

Frick's use of the learning progress scale is based on the second of Donald Kirkpatrick's (1998) four levels of evaluating training programs. Kirkpatrick (1998) points out that in order to measure learning, three things must be measured: knowledge, skills, and attitudes. Frick's scale allows for a deeper examination students' perceptions of how their Second Life class affected their development of knowledge, skills, and attitudes.

Student Satisfaction

Frick bases the student satisfaction scale on Kirkpatrick's first level of evaluating training programs: reaction. Kirkpatrick (1998) discusses the importance in measuring reaction to evaluate instructor performance and identify the need for changes to future versions of courses or training sessions. Measuring student satisfaction is important to this study because it can help instructors know whether integration of constructivist principles in a Second Life class can lead to greater student interest in the class.

Quality of Course and Instructor

The quality of course and instructor items in the TALQ evaluation come from global items found in course evaluations at Indiana University. There have been several studies that have found students' subjective view on the course and instructors is positively related to student achievement (Abrami 2001; Abrami et al., 1990; Arthur et al. 2003; Clayson et al., 2006; Cohen, 1981; Emery et al., 2003; Feldman, 1989; Koon and Murray, 1995; Kulik, 2001; Marsh, 1984; Renaud & Murray, 2004). Measurement of this aspect of learning can lead to greater understanding of how constructivist principles interact with the student's evaluation of both course and instructor in a Second Life course.

Hypotheses and Research Questions

The following hypotheses and research questions have been formed based on a review of the pertinent literature and the need for further exploration in specific research areas.

Hypothesis 1:

a. Students who perceive a higher degree of student responsibility and initiative will report a higher level of academic learning time than students who perceive a lower degree of student responsibility and initiative.

b. Students who perceive a higher degree of student responsibility and initiative will report a higher level of learning progress than students who perceive a lower degree of student responsibility and initiative.

c. Students who perceive a higher degree of student responsibility and initiative will report a higher level of student satisfaction than students who perceive a lower degree of student responsibility and initiative.

d. Students who perceive a higher degree of student responsibility and initiative will report a higher level of quality of course and instructor than students who perceive a lower degree of student responsibility and initiative.

Hypothesis 2:

a. Students who perceive a higher degree of authentic learning context will report a higher level of academic learning time than students who perceive a lower degree of authentic learning context.

b. Students who perceive a higher degree of authentic learning context will report a higher level of learning progress than students who perceive a lower degree of authentic learning context.

c. Students who perceive a higher degree of authentic learning context will report a higher level of student satisfaction than students who perceive a lower degree of authentic learning context.

d. Students who perceive a higher degree of authentic learning context will report a higher level of quality of course and instructor than students who perceive a lower degree of authentic learning context.

Hypothesis 3:

a. Students who perceive a higher degree of co-operative support will report a higher level of academic learning time than students who perceive a lower degree of co-operative support.

b. Students who perceive a higher degree of co-operative support will report a higher level of learning progress than students who perceive a lower degree of co-operative support.

c. Students who perceive a higher degree of co-operative support will report a higher level of student satisfaction than students who perceive a lower degree of co-operative support.

d. Students who perceive a higher degree of co-operative support will report a higher level of quality of course and instructor than students who perceive a lower degree of co-operative support.

Hypothesis 4:

a. Students who perceive a higher degree of presence will report a higher level of academic learning time than students who perceive a lower degree of presence.

b. Students who perceive a higher degree of presence will report a higher level of learning progress than students who perceive a lower degree of presence.

c. Students who perceive a higher degree of presence will report a higher level of student satisfaction than students who perceive a lower degree of presence.

d. Students who perceive a higher degree of presence will report a higher level of quality of course and instructor than students who perceive a lower degree of presence.

Research Questions:

1. What learning strategies are being used in virtual learning environments? Do these strategies represent generative learning strategies?

2. Which learning strategies do students perceive as the most useful?

3. What forms of assessment are being used in virtual learning environments?

4. Which forms of assessment do students perceive as the most useful?

CHAPTER 3
METHOD

Online Surveys

This study used an online survey conducted in April and May of 2010 to collect quantitative data regarding college students' perceptions of constructivist objectives (independent variables) and learning outcomes (dependent variables) in courses that used Second Life as an instructional tool. See the literature review for full descriptions of each variable or Table 3-1 and Table 3-2 for operational definitions. The use of online surveys in research projects is growing and studies show that the results may be just as accurate as postal surveys, while providing advantages in distribution and response cycles (Lazar & Preece, 1999; Swoboda et al. 1997; Yun & Trumbo, 2000). Synchronous web-based surveys began around 1994 (Kehoe & Pitkow, 1996), and provide the ability to keep track of responses and subsequent data (Andrews, Nonnecke, & Preece, 2003). Students surveyed in this study are already using digital communication technologies as evidenced by their participation in a class using Second Life. Thus, a web-based survey is an appropriate way to collect data from these students who should be comfortable with the digital format.

Sample

A list of educational institutions using Second Life was assembled following Jennings and Collins's (2008) method of deriving a purposive sample of institutions with a virtual presence in Second Life. A purposive sample allows researchers to reach the specific population desired and is an accepted method for sampling used in many studies when a sample with specific criteria is needed. The list began with the collection of institutions found on the SimTeach.com wiki

(http://simteach.com/wiki/index.php?title=Institutions_and_Organizations_in_SL). This list is now maintained by Second Life (http://edudirectory.secondlife.com/) and can be linked to from Linden Lab's education Web page (http://secondlife.com/businesseducation/education.php). The directory is made up of 132 institutions that have identified themselves as having a presence in Second Life. The next addition came from a list of 79 community colleges with a presence in Second Life found at (http://ccsl.wetpaint.com/page/CC+Locations). The institutions from which the students for the sample were drawn were post-secondary educational institutions granting associate's degrees or higher with a real-world physical presence. From this list, individuals from each institution were contacted to identify instructors using Second Life as part of the course work for their classes who would be able to distribute the survey to their students. These instructors were identified as using Second Life as part of their curriculum by searching the web pages of the institutions listed as participating in Second Life.

People from the New Media Consortium's Campus Directory (http://sl.nmc.org), a list of 3,156 individuals who have identified themselves as being involved in education and Second Life, were also contacted to distribute survey invitations to students who met the criteria. Each member of the directory was sent a message in Second Life explaining the survey and requesting their participation. A similar message was also sent to the Second Life Educator's listserv, which is an ongoing listserv that over 5,500 educators teaching in Second Life often use to discuss issues with Second Life instruction (Miller, 2010). Finally, a snowball sampling method was employed, as each person contacted was asked to provide names and emails of other instructors whose

students meet the criteria. The final list consisted of 246 instructors who were asked if they would distribute the questionnaire to their students. This method of sampling may not reach all instructors currently teaching with Second Life, but represents the best approach available at this time. The final 16 instructors who agreed to distribute the survey were provided a short description of the project and the corresponding link to the survey that they could forward to their classes. A follow-up email was sent to the instructors to pass onto the students after one week and a second follow-up email was sent one week after the first reminder allowing students two more days to complete the survey. Once the data was collected, any responses from duplicate IP addresses were removed to ensure that no respondents took the survey twice.

The sample consisted of 648 usable cases from 1,119 students in16 different courses for a response rate of 57.9%. One financial accounting class provided 572 respondents and made up 88.3% of the sample population, a major limitation of the study. Only 1.9% of all respondents indicated that their class was conducted in completely in Second Life. Most of the courses in the sample used Second Life as one of many tools, either for a particular assignment or specific module of the course. For example, the large financial accounting class used Second Life in one of the four major assignments of the course to give students the opportunity to see accounting concepts in action. A biology class that was part of the sample used Second Life to show virtual representations of genetic experiments as well as the organization of whole genomes.

E-mail survey response rates vary significantly. Response rates of 20 percent or lower are not uncommon (Witmer, Colman, & Katzman, 1999). In fact, one meta-analysis found a range of 6 to 68% for Web-based surveys (Sackmary, 1998), and

another from 8 to 44% (Fricker & Schonlau, 2002). Adams and Cleary (2007) found little literature to establish a benchmark response rate for Web-based survey researchers to strive for and pointed to Schaefer and Dillman's (1998) suggestion that Web-based surveys should follow the same expectations as mail surveys, in which a 50% response rate would be appropriate. The 57.9% response rate for this study exceeds Schaefer and Dillman's suggestion and is appropriate for a web-based survey.

Survey Instrument

In order to measure Grabinger and Dunlap's (2000) principles of rich environments for active learning, as well as presence, two previously established surveys were used. The Distance Education Learning Environments Survey (DELES) was used to measure three of the five principles. As discussed earlier, the other two principles, authentic assessment and generative learning strategies, have been rarely discussed in the literature and, for the purposes of this study, were explored through open-ended questions that asked students how they have been assessed and what learning strategies were used in their Second Life coursework. Presence was measured by Swan et al.'s (2008) social presence questionnaire, and learning outcomes were measured by some of the scales in the recently developed Teaching and Learning Quality Evaluation (Frick et al., 2009). Respondents were asked in the informed consent to make sure their answers reflected their use of Second Life to ensure they did not answer the questions based on other learning tools they may have used in the course.

Distance Education Learning Environments Survey (DELES)

The current form of the DELES was developed and validated by Scott Walker and Barry Fraser in 2005. They created this survey in a three-stage process established by Fraser (1986) and Jegede, Fraser, and Fisher (1998), which included development

and identification of salient scales, writing individual items, and field testing analyses (Walker & Fraser, 2005). Through examination of the literature and previously developed scales, Walker and Fraser were able to identify the major components of quality distance education. Next, Walker and Fraser established the items for their scale based on previously validated questionnaires and subjected them to review by a panel of experts. Finally, they field tested the items and conducted a factor analysis to identify the most appropriate items to include in the final form of the survey (Walker & Fraser, 2005).

The factor analysis was used to determine whether the items were measuring the specific scale it was developed for and no other scales. Based on these criteria, items that loaded below .5 on their own scale or above .5 on the other scales were removed, which is consistent with Fish and Dane's (2000) method of item development. This resulted in 34 of the original 48 items being approved for the survey.

Using George and Mallery's (2001) generally applied standards of reliability, the DELES scales range from acceptable to excellent. The Cronbach's Alpha reliabilities are as follows: student interaction and collaboration (0.94), personal relevance (0.92), authentic learning (0.89), student autonomy (0.79), and active learning (0.75). These all represent good reliable ratings for internal consistency (Walker & Fraser, 2005).

The 34 items make up six scales that include the dimensions of instructor support, student interaction and collaboration, personal relevance, authentic learning, active learning, and student autonomy. Responses measure level of agreement with statements about characteristics of each of the learning principles upon which the scales are based. Instructor support does not correlate with Grabinger and Dunlap's

principles and was not included in this study. The other five scales helped to determine the levels of three out of the five principles of rich environments for active learning, with personal relevance and authentic learning being combined to represent the authentic learning context principle.

The scales used in measuring the student responsibility and initiative principle were active learning and student autonomy. The active learning scale from the DELES used student responses on a five-point Likert scale to the following items:

- I explore my own strategies for learning.
- I seek my own answers.
- I solve my own problems.

The student autonomy scale from the DELES used the following items:

- I make decisions about my learning.
- I work during times that I find convenient.
- I am in control of my learning.
- I play an important role in my learning.
- I approach learning in my own way.

In order to measure the authentic learning context principle, the personal relevance and authentic learning scales were used. This principle focuses on the relationship between students and the material presented in the class. This measure looks to assess how well the material is related to the real life of the students outside of the classroom. For the personal relevance scale from the DELES, students were asked for a response on a five-point Likert scale to the following statements:

- I can relate what I learn to my life outside of university.
- I am able to pursue topics that interest me.
- I can connect my studies to my activities outside of class.
- I apply my everyday experiences in class.
- I link class work to my life outside of university.
- I learn things about the world outside of university.
- I apply my out-of-class experience.

For authentic learning the following statements from the DELES were used:

- I study real cases related to the class.
- I use real facts in class activities.
- I work on assignments that deal with real-world information.
- I work with real examples.
- I enter the real world of the topic of study.

Finally, the DELES measured co-operative support through the student interaction and collaboration scale. As discussed earlier, the ability for students to work together is one of the central principles of rich environments for active learning. Six items were used to assess student interaction and collaboration through responses on a five-point Likert scale. The six items from the DELES were:

- I work with others.
- I relate my work to others' work.
- I share information with other students.
- I discuss my ideas with other students.
- I collaborate with other students in the class.
- Group work is a part of my activities.

These items get at the central idea of cooperative support, working with other students and provide a solid basis for understanding whether students think cooperative support is happening in their class.

Presence Questionnaire

In order to measure social presence, part of an instrument developed by Swan et al. (2008) was used. The entire instrument measures three types of presence: teacher presence, social presence, and cognitive presence. For this study, only the social presence scale was used. This consisted of nine questions from the Swan et al. instrument related to focusing on "the degree to which participants in computer-mediated communication feel affectively connected one to another" (Swan et al., 2008, pp.2)." Internal consistency, as measured by Cronbach's Alpha, rated at 0.91 for the

social presence scale according to Swan et al. (2008). The nine items required a response on a five-point Likert scale to the following statements:

- Getting to know other course participants gave me a sense of belonging in the course.
- I was able to form distinct impressions of some course participants.
- Online or web-based communication is an excellent medium for social interaction.
- I felt comfortable conversing through the online medium.
- I felt comfortable participating in the course discussions.
- I felt comfortable interacting with other course participants.
- I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
- I felt that my point of view was acknowledged by other course participants.
- Online discussions help me to develop a sense of collaboration.

Teaching and Learning Course Quality Evaluation (TALQ)

All four dependent variables were measured using scales derived from the TALQ developed by Frick et al. (2009). The authors cite a Cronbach's Alpha score of 0.85 for the academic learning time portion of this evaluation. In order to measure academic learning time in the TALQ, the scale asks for student responses to the following statements:

- I frequently did very good work on projects, assignments, problems and/or learning activities for this course.
- I spent a lot of time doing tasks, projects and/or assignments, and my instructor judged my work as high quality.
- I put a great deal of effort and time into this course, and it has paid off—I believe that I have done very well overall.

The learning progress scale rated extremely high in internal consistency, receiving a Cronbach's Alpha score of 0.97 (Frick et al., 2009). This scale measures learning progress by asking for student responses to the following statements:

- Compared to what I knew before I took this course, I learned a lot.
- I learned a lot in this course.
- Looking back to when this course began, I have made a big improvement in my skills and knowledge in this subject.

- I learned very little in this course.
- I did not learn much as a result of taking this course.

The final two are negatively worded statements and were reverse scored in the analysis.

The student satisfaction portion of the TALQ was also very high in internal consistency, with a Cronbach's Alpha score of 0.94. (Frick et al., 2009). Frick measured student satisfaction through responses to the following statements:

- I am dissatisfied with this course.
- This course was a waste of time and money.
- I am very satisfied with this course.

The quality of course and instructor scale received a Cronbach's Alpha score of 0.92 (Frick et al., 2009). Items for this scale required responses to the following three statements:

- Overall, I would rate the quality of this course as outstanding.
- Overall, I would rate this instructor as outstanding.
- Overall, I would recommend this instructor to others.

Open-Ended Questions

As discussed earlier, the principles of authentic assessment and generative learning strategies were examined through open-ended questions. For authentic assessment, the question was, "Which forms of grading did you find to be the most useful in gauging your performance in the course and learning of the content?" For generative learning strategies, the questions were, "What types of activities did you participate in as part of the requirements for this course?" and "Which of these activities did you find to be the most helpful in terms of helping you perform well in the course and learn the material?"

Pretesting

In order to better anticipate any problems with the survey, 151 students participating in an undergraduate telecommunications course pretested the questionnaire. The students provided feedback on the technical functionality, structure, and content of the survey, providing useful insight into how undergraduate students would come to understand the questions. Comments on the survey were positive and no revisions were necessary.

Analysis

Diagnostic Tests

Prior to correlation and regression analyses being conducted, several diagnostic tests were run in order to make sure the sample fit the assumptions of a linear regression analysis. Histograms and scatterplots showed normal, linear, homoscedastic relationships between the variables and skewness and kurtosis fell within the commonly defined acceptable levels of +/- 1. Any outliers that were 1.5 IQR (interquartile range) below the first quartile or above the third quartile were removed from the 4 independent and 4 dependent variables. Bivariate correlations were also run between the scores on all independent variables (student responsibility and initiative, authentic learning context, co-operative support, and presence and the scores on academic learning time, learning progress, student satisfaction, and quality of course and instructor) in order to detect any multicollinearity. No multicollinearity problems were found; additional multicollinearity tests also did not reveal any potential issues between the independent variables.

Analytical Tests

Bivariate correlations and multiple regression tests were used as the primary analytical tests. Correlation results were used to determine the strength of relationships between the constructivist principles and the student-perceived learning outcomes. Multiple regression was then applied to find the best predictors of academic learning time, learning progress, student satisfaction, and quality of course and instructor.

The open-ended questions that pertained to the authentic assessment and generative learning strategies principles were qualitatively evaluated to gain an understanding of what practices are being used in classes taught with virtual worlds, as well as to see which of these practices the students perceive to be the most effective in relation to their learning. Open-ended responses were analyzed to see which forms of assessment and learning strategies students find to be the most effective in teaching a course using Second Life. When multiple responses indicated the same form of assessment or learning strategy, that response was noted in the results. If students indicated preference for certain assessment and learning strategies, this showed that the form of assessment or learning strategy discussed was pertinent to the student and may be appropriate for more in-depth research.

The quantitative analysis provided greater insight into how the application of constructivist principles affects students' perceived learning and satisfaction in courses taught with a Second Life component. Analysis of the free-text responses pointed to forms of assessment and learning strategies that are preferred by students in these classes. Altogether, this study begins to fill the gap in research on student perceptions of the effectiveness of Second Life as an instructional tool. Further research will be necessary to fully explore the possibilities of Second Life and similar virtual worlds to

affect student learning, but this study provides much needed insight into how students evaluate the use of this new technological tool in the classroom.

Table 3-1 Operational definitions of independent variables

Independent variable	Operational definition
Student responsibility and initiative	The ability of the learner to participate in intentional learning, questioning, self-reflection, and adjustment of metacognitive skills
Authentic learning context	Learning experiences which are realistic, taking into account students' age, maturity, and environmental constraints such as safety and available resources
Co-operative support	Allowing students to work together and be responsible not only for their own learning, but that of their fellow students
Presence	The level of connectivity between participants in a computer-mediated environment

Table 3-2 Operational definitions of dependent variables

Independent variable	Operational definition
Academic learning time	The time students perceive they spent successfully engaged in activities that work towards the course objectives
Learning progress	The student's perceived development of knowledge skills and attitudes
Student satisfaction	The student's understanding of how the learning they experienced matched their expectations
Quality of course and instructor	The student's evaluation of the effectiveness of the course and instructor in helping them reach their learning objectives

Table 3-3 Hypotheses and Variables

Hypotheses and Research Questions	Independent Variables	Scales	Dependent Variables
$H1_a$	Student responsibility and initiative	Active learning and student autonomy (DELES)	ALT
$H1_b$			LP
$H1_c$			SS
$H1_d$			QCI
$H2_a$	Authentic learning Context	Personal relevance and authentic learning (DELES)	ALT
$H2_b$			LP
$H2_c$			SS
$H2_d$			QCI
$H3_a$	Co-operative support	Student interaction and collaboration (DELES)	ALT
$H3_b$			LP
$H3_c$			SS,
$H3_d$			QCI
$H4_a$	Presence	Social presence (Community of Inquiry Instrument)	ALT
$H4_b$			LP
$H4_c$			SS
$H4_d$			QCI
RQ1, RQ2	Authentic assessment		
RQ3, RQ4	Generative learning strategies		

ALT = Academic learning time (TALQ)
LP = Learning progress (TALQ)
SS = Student satisfaction (TALQ)
QCI = Quality of course and instructor (TALQ)

CHAPTER 4
RESULTS

The results of this study paint a picture of how students perceive constructivist elements in courses that use Second Life as an instructional tool. Coming to an understanding of which constructivist concepts are most important to students and their learning allows instructors to focus on those qualities of their courses that will make the biggest difference in students' interest and performance. By grouping the results into Grabinger's principles of rich environments for active learning, this study makes findings of student perceptions of constructivist principles readily available for researchers to continue examining how constructivist concepts work in mediated environments, and, more importantly, provides instructors with a starting by which to create new mediated classrooms or improve their existing ones.

Overall, these results show that authentic learning context and presence had the greatest effect on student-perceived learning outcomes. Student responsibility and initiative also played a part in improving the measured learning outcomes. Results were mixed regarding the relationship between co-operative support and student learning outcomes but tended toward negative and negligible. The responses to open-ended questions indicated that students favored tests when the tests accurately reflected the material learned, but overall, preferred outside assignments as assessment measures. The students also valued opportunities to work together and assignments that provided connections to the real world. Second Life was seen as a course component that allowed for interaction with other students and instructors as well as opened the door to integration of realistic scenarios. On occasion, students discussed their view that

Second Life had a relatively steep learning curve that could have an effect on the learning of the content.

Quantitative Results

Descriptive Findings of Sample

Several questions were asked to gain a better description of the respondents in the sample. When asked about their previous use of Second Life, 97.1% of the respondents reported that this was the first class they had taken that used Second Life and 89.5% reported that they had been using Second Life for less than 6 months. The respondents' ages ranged from 18 to 61 with 87.1% of the respondents indicating they were 18 to 24 years old. The sample's gender distribution was almost even with 51.1% male and 48.9% female.

Findings of Key Variables

All dependent variables were tested for reliability by computing the internal consistency of each scale as used in this study. All variables tested within the acceptable range and were close to Frick et al.'s internal consistency scores. The dependent variables in this study received Cronbach's Alpha scores of 0.80 (academic learning time), 0.89 (learning progress), 0.89 (student satisfaction), and 0.93 (quality of course and instructor). Throughout the results, Cohen's scale was used to describe the effect size. Cohen refers to Pearson's correlation coefficients of less than 0.1 as negligible, 0.1-0.3 as weak, 0.3-0.5 as moderate, and greater than 0.5 as strong (Cohen 1988, 1992).

Student responsibility and initiative

The first hypothesis ($H1_{a\text{-}d}$) asserted that students who perceive a higher degree of student responsibility and initiative will report a higher level of academic learning time,

learning progress, student satisfaction, and quality of course and instructor than students who perceive a lower degree of student responsibility and initiative. In order to test this, the active learning scale and the student autonomy scale from the DELES survey were combined to measure levels of student responsibility and initiative. Results of a reliability test show that responses to the eight questions in this scale had a Cronbach's Alpha score of .866. Bivariate correlations were conducted on the scaled response and measures of the four dependent variables. The results of a Pearson's correlation analysis (see Table 4-1) indicate a moderate, positive, and significant correlation between student responsibility and initiative and academic learning time, $r(628) = .343$, $p < .0001$. The results show weak, positive, and significant correlations between student responsibility and initiative and learning progress, $r(616) = .281$, $p < .0001$, student satisfaction, $r(625) = .231$, $p < .0001$, and quality of course and instructor, $r(628) = .152$, $p < .0001$. In order to ensure that these results were not skewed by the large percentage of the sample that came from one financial accounting class (see Table 4-1), correlations were also run with the respondents from the other classes and a random sample of 20 from the large financial accounting class. Twenty represents the number of students from each of the two largest sections when the financial accounting class is removed. These results show a strong, positive, and significant correlation between student responsibility and initiative and academic learning time, $r(91) = .507$, $p < .0001$; a moderate, positive, and significant correlation between student responsibility and initiative and learning progress, $r(90) = .378$, $p = .004$, as well as student satisfaction, $r(91) = .363$, $p < .0001$; and a weak, positive, and significant correlation between student responsibility and initiative and quality of course

and instructor, $r(91) = .212$, $p = .041$. These results provide moderate support for $H1_a$ and weak support for $H1_b$, $H1_c$, and $H1_d$..

Authentic learning context

The second hypothesis ($H2_{a\text{-}d}$) stated that students who perceive a higher degree of authentic learning context will report a higher level of academic learning time, learning progress, student satisfaction, and quality of course and instructor than students who perceive a lower degree of authentic learning context. This hypothesis was tested using a composite authentic learning context score, derived from the combination of the personal relevance and authentic learning scales from the DELES survey, which was then correlated with the dependent measures. Results of a reliability test show that responses to the twelve questions in this scale had a Cronbach's Alpha score of .921. The results of a Pearson's correlation analysis (see Table 4-1) show moderate to strong, positive, and significant correlations between authentic learning context and academic learning time, $r(611) = .396$, $p < .0001$; learning progress, $r(604) = .420$, $p < .0001$; student satisfaction, $r(611) = .490$, $p < .0001$; and quality of course and instructor, $r(615) = .500$, $p < .0001$. Once again, statistics were also run with a random sample of the large financial accounting class and all respondents not in the financial accounting class. The results again show moderate to strong, positive, and significant correlations between authentic learning context and academic learning time, $r(89) = .461$ $p < .0001$; learning progress, $r(88) = .435$, $p < .0001$; student satisfaction, $r(89) = .516$, $p < .0001$; and quality of course and instructor, $r(89) = .447$, $p < .0001$. These results provide moderate to strong support for hypothesis two ($H2_{a\text{-}d}$).

Co-operative support

This study also hypothesized that students who perceive a higher degree of co-operative support will report a higher level of academic learning time, learning progress, student satisfaction, and quality of course and instructor than students who perceive a lower degree of co-operative support ($H3_{a-d}$). The student interaction and collaboration scale from the DELES survey served as the measurement of co-operative support, and bivariate correlations were then conducted with the dependent variables to see if they were positively related. Results of a reliability test show that responses to the six questions in this scale had a Cronbach's Alpha score of .952. The results of a Pearson's correlation analysis (see Table 4-1) show weak, positive, and significant correlations between co-operative support and academic learning time, $r(522) = .137$, $p < .0001$, as well as quality of course and instructor, $r(521) = .119$, $p = .006$. The analysis showed no significant correlation between co-operative support and learning progress or student satisfaction. When the respondents from the large financial accounting class were reduced to a smaller sample, the results indicated moderate, positive, and significant correlations between co-operative support and academic learning time, $r(93) = .432$, $p < .0001$ and student satisfaction, $r(93) = .330$, $p = .001$. The analysis showed a weak, positive, and significant correlation between student responsibility and initiative and quality of course and instructor, $r(93) = .273$, $p = .008$. However, the correlation between co-operative support and learning progress is weak and only significant at $p < .1$ level, learning progress, $r(91) = .186$, $p = .074$. These results provide weak to moderate support of $H3_a$ and $H3_d$, but do not support $H3_b$ and $H3_c$. While academic learning time and quality of course and instructor rose in relation to rising levels of co-

operative support, it is unclear if there is a relationship between co-operative support and learning progress or student satisfaction.

Presence

The fourth hypothesis ($H4_{a\text{-}d}$) stated that students who perceive a higher degree of presence will report a higher level of academic learning time, learning progress, student satisfaction, and quality of course and instructor than those who perceive a lower degree of presence. The social presence portion of Swan et al.'s (2008) presence survey was used to establish a presence score and subsequently correlations were run with the dependent measures. Results of a reliability test show that responses to the nine questions in this scale had a Cronbach's Alpha score of .896. The results of a Pearson's correlation analysis (see Table 4-1) show weak, positive, and significant correlations between presence and academic learning time, $r(603) = .210$, $p < .0001$ and learning progress, $r(595) = .232$, $p < .0001$. The results show moderate, positive, and significant correlations between presence and student satisfaction, $r(603) = .319$, $p < .0001$, and quality of course and instructor, $r(606) = .428$, $p < .0001$. Results were also significant using a smaller sample of the large financial accounting class, showing moderate, positive, and significant correlations between presence and academic learning time, $r(83) = .317$, $p = .003$; student satisfaction, $r(83) = .435$, $p < .0001$; and quality of course and instructor, $r(83) = .475$, $p < .0001$. There was also a weak, positive, and significant correlation between presence and learning progress, $r(82) = .237$, $p = .030$. These results provide support for hypothesis four ($H4_{a\text{-}d}$).

Regression analyses

While bivariate correlational analysis best relates to the hypotheses proposed in this study, it is always possible that other variables are influencing the results.

Therefore, in order to further examine what best predicts academic learning time, learning progress, student satisfaction, and quality of course and instructor, regression analyses were performed on these four dependent variables. Six variables were used as predictors in the regression, student responsibility and initiative, authentic learning context, co-operative support, presence, gender, and class rank. Standardized regression coefficients were used to interpret the results.

As presented in Table 4-2, the results of a linear regression analysis show that the six variables in the model accounted for a significant portion of the variance in academic learning time, $R^2_{adj} = .204$, $F(6, 467) = 20.958$, $p < .0001$. Student responsibility and initiative, authentic learning context, and presence emerged as weak, positive, and significant predictors of academic learning time. However, the results show that co-operative support was not a significant predictor of academic learning time while holding all other variables constant.

A six-item model was also created to predict learning progress scores. As the linear regression presented in Table 4-3 shows, this model accounted for a significant portion of the variance in learning progress, $R^2_{adj} = .205$, $F(6, 460) = 20.757$, $p < .0001$. Authentic learning context showed up as a moderate, positive, and significant predictor of learning progress. Student responsibility and initiative and presence exhibited a weak, positive, and significant effect on learning progress. The bivariate correlation reported earlier showed mixed results concerning the relationship between co-operative support and learning progress. After further investigation it was revealed that when controlling for all other variables, co-operative support is a weak, negative, and

significant predictor of student satisfaction. That is, as students' scores on co-operative support increase, their levels of satisfaction decrease.

As presented in Table 4-4, the results of a linear regression analysis show that the six variables in the model accounted for a significant portion of the variance in student satisfaction, $R^2_{adj} = .286$, $F(6, 465) = 32.019$, $p < .0001$. Authentic learning context emerged as a moderate, positive, and significant predictor of student satisfaction. Presence exhibited a weak, positive, and significant effect on student satisfaction. Although the results of the bivariate correlation between co-operative support and student satisfaction reported earlier show a significant, positive, albeit weak relationship, it appears this finding may be unreliable. As the regression reported in Table 4-4, when controlling for all other variables, co-operative support is revealed to be a weak, negative, and significant predictor of student satisfaction. That is, as co-operative support increases, the less satisfied the student becomes.

Finally, the results of a linear regression analysis show that the six-item model used to predict quality of course and instructor scores accounted for a significant portion of the variance, $R^2_{adj} = .272$, $F(6, 466) = 29.981$, $p < .0001$. As Table 4-5 shows, authentic learning context showed up as a moderate, positive, and significant predictor of quality of course and instructor. Presence emerged as a weak, positive, and significant predictor of quality of course and instructor. Class rank (i.e. freshman, sophomore, junior, senior, or graduate student) also had a weak, positive and significant effect on quality of course and instructor. The earlier bivariate analysis showed mixed results concerning the relationship between co-operative support and quality of course and instructor. The earlier analysis also showed student responsibility and initiative to

have a significant positive correlation with quality of course and instructor. When controlling for all other variables student responsibility and initiative is no longer a significant predictor and co-operative support is shown to be a weak, significant, and negative predictor of quality of course and instructor.

Responses to Open-Ended Questions

Authentic Assessment

Type of assessment

Due to a lack of research on types of assessment in classes that use virtual environments, open-ended questions were used at the end of the survey to gauge the modes of assessment used in these classes. The responses to open-ended questions about what forms of assessment students believed to be most useful provided valuable insight. The students were asked, “Which forms of grading did you find to be the most useful in gauging your performance in the course and learning of the content?” Overall, the responses indicated a split between those who thought the tests in their particular course were accurate assessments of knowledge gained in the course and those who thought these tests could not gauge what the students had actually learned. Students who found exams to be accurate, voiced this through comments such as, “I feel that the exams give[n] are the best barometer of how much I have learned in the course. With the other assignments, I can take my time to ensure I get a good grade, but in the exam there is limited time and no books, notes, etc.,” and “The way the tests were formatted and graded helped me measure my performance and learn from my mistakes.” Others felt tests were not accurately measuring their comprehension of the content, like the student who described “a test with questions not at all similar to examples provided in the book or class.”

Students often described the outside assignments as the best method for assessing their knowledge. Activities including concept maps, an online accounting lab, and use of Second Life were often mentioned as ways in which the students in the large financial accounting class could be truly evaluated on what they had learned. Students positively described these experiences in some of the following ways, “I really like the idea of a hands-on project about something that’s really interesting to you.”, “Second Life was useful because it allowed me to apply theory to questions in the book. You either get the questions right or wrong which allows me to figure out whether or not I fully understand the question and procedure for resolution” and “I think the real-life scenarios we used in our [S]econd [L]ife homework helped me the most.” Some of these outside assignments allowed for group interaction, which several students pointed to as a positive experience through comments like, “I find that group activities and online discussions help me learn more in class.”, “I enjoyed using Second Life. It gave me the opportunity to work with others and learn very difficult material in an easier environment.” and “I liked how while using Second [Li]fe we could correspond with one another thus making problems easier to understand if you were struggling.”

Feedback on performance

Several of the students stressed the importance of receiving feedback, either through monitoring of their grades or comments from the professor on their work. The students discussed the advantages of monitoring their grades through comments such as, “I like the point system because I enjoyed knowing where I stood throughout the class. I saw my progress and felt that I earned my grade,” or “The immediate showing of our grade on WebCourses as soon as an assignment was completed, helped to keep track of progress in the course.” Responses that reflected the value students placed on

instructor feedback included, “the most helpful thing about the style of grading my professor uses is the in-depth individual comments that accompany all of our written assignments” and “teacher input seems to be the best because it gives the student guidance on how to improve.”

Generative Learning Strategies

The responses to open-ended questions concerning which activities were most helpful in terms of performing well in the class produced a wide variety of answers. The students were asked, “What types of activities did you participate in as part of the requirements for this course?” and, “Which of these activities did you find to be the most useful in terms of helping you perform well in the course and learn the material?” Students described activities through which they constructed products that represent the learning that had taken place. One of the most common responses, which came from the large financial accounting class referred to creating concept maps. This project required students to show relationships between ideas learned in class by connecting them with lines and arranging them in a hierarchical order from general down to specific. Students responded that the concept maps “help the most in organizing thoughts” and “were extremely great studying tools.” Other responses included “propose a business plan,” “making a web page,” “design an ad campaign and present to a set of mock clients,” and “created a video presentation exploring interactive media and its ability to create bridges for Palestinians and Israelis,” all examples of creating a new product as part of the learning process .

Students from the financial accounting class often talked about their positive experiences with a program called My Accounting Lab as well as Second Life. The My Accounting Lab program allowed them to try several of the problems that were similar to

what they would see on the test and to get help on problems that they struggled with. Second Life, on the other hand, provided realistic situations through which they could see the concepts applied. Students remarked, “The second life activities helped the most i think because its [sic] the closest you can get to a hands-on experience in big classes.”, “Second Life adds some real-life problem solving into this course and this situation is likely to occurr [sic] in the business world in other computing environments.”, “The [S]econd [L]ife activites helped the most I think because its [sic] the closest you can get to a hands on experience in big classes.” and “Integrating accounting lessons into Second Life adds some real-life problem solving into the course.” Not all students agreed, however, as some discussed Second Life as being too technically challenging to provide much benefit; “[Second Life] was more a technical challenge than an accounting one.” and “Getting Second Life set up and usable took [a] lot of time and effort. I did not think it helped in learning the material” .

Many students found the opportunities to consult with others in group activities to be very helpful. Students pointed out, “Interacting in groups helped me understand the knowledge and creativity of my peers.”, “I believe Second Life was quite helpful because other students are always present to help with understanding course material.” and “Learning from others’ presentations was quite helpful in learning. Class discussions were also useful.” Many students also indicated that interaction with the professor and teaching assistants was valuable and that Second Life provided a place where interactions with instructors and other students could take place.

The responses to the open-ended questions represented a variety of thoughts and concerns of the students. The responses went beyond the concepts of authentic

assessment and generative learning strategies and touched on several ideas that were important to the students. This provided greater insight into the students' experiences in their classes as well as possibilities for future research.

Summary of Results

Overall, the results indicate that authentic learning context and presence are important factors in mediated learning environments that use Second Life as an instructional tool. Student responsibility and initiative, as measured in this study, played a role in student perceptions of academic learning time and learning progress, but not in student satisfaction and quality of course and instructor. The relationship between co-operative support and perceived learning outcomes is unclear based on the results from this study. Support is present for H1, H2, and H4, but not for the third hypothesis.

Students also provided a wide range of ideas on what forms of assessment and learning strategies were most effective. They indicated that tests that accurately reflected the learning material, instructor feedback, and realistic outside assignments were the most useful in gauging progress in the course. Learning activities that allowed for work with others and represented authentic ways in which the concepts learned may be applied outside the course were the most important learning strategies to the students. There was also evidence that students were sometimes frustrated by the technical difficulty of Second Life and were slowed down by some of the time requirements involved with learning to function in the virtual world.

Table 4-1 Correlations for entire and balanced samples

Constructivist principles	Entire sample				Balanced sample			
	ALT	LP	SS	QCI	ALT	LP	SS	QCI
Student responsibility and initiative	.343*	.281*	.231*	.152*	.507*	.378*	.363*	.212*
Authentic learning context	.396*	.420*	.490*	.500*	.461*	.435*	.516*	.447*
Co-operative support	.137*	-.045	.069	.119*	.432*	.186	.330*	.273*
Presence	.210*	.232*	.319*	.428*	.317*	.237*	.435*	.475*

Balanced sample includes all respondents not in large financial accounting class and 20 randomly selected respondents from the financial accounting class.
* indicates significance at p<.05 level.
ALT = Academic learning time (TALQ)
LP = Learning progress (TALQ)
SS = Student satisfaction (TALQ)
QCI = Quality of course and instructor (TALQ)

Table 4-2 Academic learning time regression results

Model	Unstandardized coefficients		Standardized coefficients		
	B	SE	Beta	*t*	*p*
Student responsibility and initiative*	.122	.022	.242	5.483	.000
Authentic learning context*	.068	.013	.254	5.330	.000
Presence*	.057	.018	.150	3.117	.002
Co-operative support	-.023	.019	-.057	-1.254	.211
Gender	.191	.184	.044	1.039	.299
Class rank	-.144	.089	-.069	-1.621	.106

* indicates significance at p<.05 level.

Table 4-3 Learning progress regression results

Model	Unstandardized coefficients		Standardized coefficients		
	B	SE	Beta	*t*	*p*
Student responsibility and initiative*	.163	.040	.185	4.124	.000
Authentic learning context*	.147	.024	.303	6.254	.000
Presence*	.117	.033	.173	3.591	.000
Co-operative support*	-.168	.033	-.237	-5.069	.000
Gender	-.072	.325	-.009	-.223	.824
Class rank	-.185	.157	-.050	-1.177	.240

* indicates significance at p<.05 level.

Table 4-4 Student satisfaction regression results

Model	Unstandardized coefficients		Standardized coefficients		
	B	SE	Beta	*t*	*p*
Authentic learning context*	.140	.016	.406	8.929	.000
Presence*	.115	.022	.236	5.152	.000
Co-operative support*	-.098	.023	-.187	-4.301	.000
Student responsibility and initiative	.052	.027	.080	1.910	.057
Gender	.157	.224	.028	.702	.483
Class rank	.054	.108	.020	.501	.616

***** indicates significance at p<.05 level.

Table 4-5 Quality of course and instructor regression results

Model	Unstandardized coefficients		Standardized coefficients		
	B	SE	Beta	*t*	*p*
Authentic learning context*	.124	.016	.349	7.619	.000
Presence*	.137	.023	.272	5.888	.000
Co-operative support*	-.068	.023	-.127	-2.886	.004
Class rank*	.317	.112	.114	2.824	.005
Student responsibility and initiative	-.008	.028	-.012	-.278	.781
Gender	.418	.232	.073	1.803	.072

* indicates significance at p<.05 level.

CHAPTER 5
DISCUSSION

New digital technologies offer valuable opportunities to improve learning. Many of these technologies, such as social networking, wikis, podcasts, and virtual worlds give learners a greater ability to directly participate and to learn with others. Today's students are more accustomed than previous learners to using these technologies in their daily lives and welcome the use of them in their learning activities. Faculty members have limited time to devote to designing instruction and must focus on using methods that result in the most learning in the time available. Faculty members need to consider what technologies best appeal to their students and can successfully relate the course concepts to students. Virtual worlds like Second Life represent one of the newest technologies to make its way into the classroom. Though research is still needed to determine the best uses of virtual worlds as an instructional tool, they have real potential to provide an exciting new way to reach today's students.

The purpose of this study was to determine how various constructivist objectives factor into student success in classes that use Second Life as an instructional tool. This study was initially intended to survey classes that used Second Life as the main tool for learning, but, as the sample was gathered, it became apparent that more classes are using Second Life as one of a variety of instructional tools. While this study may provide less of a perspective on how constructivist objectives affect a class fully immersed in Second Life, it offers a valuable examination of the way in which Second Life is being used in higher education instruction at this point and how constructivist objectives affect student outcomes when a mediated environment is a component of the class.

Student Responsibility and Initiative

The concept of student responsibility and initiative focuses on the students' active role in the learning process. The results of this study provided evidence that these higher scores were significant predictors of increased academic learning time and learning progress. Student responsibility and initiative was a negligible significant predictor of student satisfaction and did not play a role in quality of course and instructor. Students who believe that the learning process is in their hands may be more inclined to spend more time and be more focused on the time they do spend on work for a class. When students believe they do not have control or that their learning is wholly dependent on the instructor, they may feel a disconnect from the learning process and that a greater investment of time will be fruitless. Some of the responses to the open-ended questions showed that outside assignments in which students could work at their own pace allowed students to work with a concept for as long as it took to feel comfortable with their understanding of the concept. If students feel the pace is out of their control their potential to become lost increases. They may feel that as the course progresses the workload becomes insurmountable and concepts that build upon earlier work in the class may quickly become out of reach. While responsibility for this type of problem often rests with the instructor, this may also be the fault of the student who does not invest the appropriate amount of time and control over his work in the early part of the class and finds he cannot catch up as the course moves on.

The fact that student responsibility and initiative did not emerge as a significant predictor of quality of course and instructor could be due to students' having different expectations for the course. Though students with high levels of student responsibility and initiative may have spent a significant amount of time and learned a great deal, they

may not have learned the things they expected, may not have earned the grade they expected or they may have felt the instructor should have been more involved. It also seems intuitive that those who have taken much of the responsibility on themselves would be less variable in their ratings of course and instructor. For those with high student responsibility and initiative, the instructor and course framework just become guides.

Instructors should be clear early in the course about what the student is expected to learn and what the student workload is going to be throughout the course. This will ensure the alignment of student and teacher goals and prompt students who enter the class with different expectations to find other courses. Students must also be prepared to alter their ideas about course objectives and activities and understand that the instructor is working to present the material in the most effective way. Students who do not see the value in either objectives or activities should discuss this with the instructor early on so that they may come to better understand the reasoning behind both.

Student responsibility and initiative takes work from both the instructor and student. Lack of effective implementation by either party may have serious implications for how students spend their time and progress in their learning. Second Life may be helpful to instructors in this aspect by giving them a place to design instructional activities through which the students can work at their own pace. This ensures that the responsibility for learning is placed in the hands of the students and makes it more likely that a student with true internal motivation will make the appropriate investment in the learning process.

Authentic Learning Context

Authentic learning context refers to the relationship between the learning that takes place during a course and the application of that learning outside of the classroom. The results of this study point to a moderate to strong connection between high ratings of authentic learning context and increased academic learning time, learning progress, student satisfaction, and quality of course and instructor. In fact, authentic learning context appeared to have the strongest effect among all of the independent variables.

When students see that the concepts and skills they learn in class can be useful to them in their lives outside of the class, they are likely to spend more time in pursuit of a useful understanding of that knowledge. On the other hand, it is natural that concepts or skills that seem to be relevant only in the class context would lower motivation. An important piece of higher education is acquiring skills that will be useful to students as they enter the job market. When classes highlight the importance that skills and concepts of a class play in the outside world, students may see these as priorities and devote more of their resources to progress in areas that may benefit them later. Consequently, these realistic courses and the instructors who are able to help students see the connection between their classes and the real world may become more highly rated themselves. Students' satisfaction with these courses may also increase as they evaluate their own ability to successfully function outside of the classroom.

In order to help students understand how useful knowledge gained in a course can be to life outside the course, instructors should provide "real life" examples" and work through instructional activities that reflect processes similar to what students may come in contact with outside the classroom. Instructors have a responsibility to know how

concepts from their course are continually being applied outside of the classroom. Students who feel that that they may only apply knowledge learned in the class to other classroom situations will find little value in that knowledge as they will be unable to see how it relates to the real world. Second Life offers a new approach to providing an authentic learning context through simulation of real world applications of skills. Several case studies so far detail simulations of interviews or discussions with hospital patients in Second Life to teach journalism or nursing skills. In this study, students highlighted this concept, discussing the simulation of a business in Second Life to show accounting practices in action. Whatever the method, instructors today must meet the demands of both employers and students for skills that can be applied in the workplace. Those who can effectively relate their classes to the real world will continue to thrive in today's education environment.

Presence

Presence was examined as Swan et al. (2008) describe it: "the degree to which participants in computer-mediated communication feel affectively connected one to another" (p. 2). There appears to be a weak positive relationship between presence and academic learning time, learning progress, student satisfaction, and quality of course and instructor. Those with higher presence scores had significantly higher scores in these student-perceived learning outcomes.

Students who felt more comfortable in the computer-mediated portions of the course likely spent more time and better understood the content offered through computer-mediated technology. These students may have also had more opportunities to converse with other students or their instructors by making use of the technology's ability to allow for computer-mediated meetings. The learning environment itself plays

an important role in the process of learning. If instructors can provide an environment that is comfortable, amenable to change, and consistently available, students may find that they are willing to spend more time there, work harder on learning activities, and get more out of the course.

Second Life provides an interesting compromise between traditional brick and mortar classrooms and online classrooms with limited capacity for meaningful contact with students and instructors. In order to satisfy the rising demands of higher education, many schools are looking to transfer many classes from traditional classrooms to the online environment. While allowing for more students to take part in a course, some of the collaborative opportunities, as well as familiarity with both instructors and other students, may be lost. The potential for students and instructors to come together and converse synchronously in a virtual environment, either through text chat or more personal voice chat, allows for students to make better connections with instructors as well as other students who can provide help with course-related issues. This may, in turn, take pressure off of instructors who become one of many resources to which the student can turn for help. Students may, in fact, feel more comfortable learning from other students, who are approximately at the same knowledge level, rather than going to a professor, whom they feel may look down at their lack of knowledge. It would seem that greater feelings of social presence benefit both instructors and students by creating an environment in which learning can be shared among all of the participants.

Implementing Both Authentic Learning Context and Presence.

It is important to note that presence and authentic learning context were shown to be the most valuable predictors of the student-perceived learning outcomes in this

study. When used together, they have the potential to significantly improve learning. In the real world, being able to communicate with others who can provide help is a valuable resource. Instructors may assign projects that not only reflect realistic situations in which the students can apply knowledge from the class, but also require cooperation with others. In this way, each student can strengthen his own knowledge by relating what he knows to others and learning from others about the concepts he has not yet grasped. Adding more opportunities to increase social presence may not only improve students' success in the course but will also give them more experience in developing social skills that will be useful when entering the working world.

Co-operative Support

The principle of co-operative support addresses how students in a course work together and whether they share responsibility for each other's learning. The correlation results examining the relationship between co-operative support and academic learning time, learning progress, student satisfaction, and quality of course and instructor were mixed and the regression analyses actually showed a significantly negative relationship to be present between co-operative support and all of the dependent variables except academic learning time, where there appears to be no significant relationship at all.

A possible explanation of co-operative support as a negative predictor is that those students who wished to work alone and who did not want to take on any responsibility for the work of others saw the co-operative portions of the class as a hindrance. Some students may have had previous bad experiences working with other students and felt more confident about completing the work on their own. Although this may have been the cause of the co-operative support variable showing up as a negative predictor, it is

possible that there was simply a problem with the measurement of this variable and that other variables may have overlapped with co-operative support, mediating the effect.

One of the reasons for mixed correlation and regression results may be that the co-operative support variable contained a large number of low scores skewing the results to the lower end. This indicates that the courses that were a part of this survey, especially the large financial accounting class, may not have had many collaborative opportunities. This in and of itself would not allow for a true analysis of the effect of co-operative support on various learning outcomes.

Another possibility is that the scale used to measure co-operative support may need to be refined in order to accurately capture the construct. Though the scale from which it was derived has been used before, it has not been used in courses with virtual world components. Previous uses of the scale focused on distance education courses that did not include virtual world activities. Further development and testing of this scale may be necessary before it can be used to measure co-operative support in the manner attempted in this study.

Another possible reason for the mixed results concerning the co-operative support variable is that both presence and authentic learning context appear to have a mediating effect on co-operative support. Both the co-operative support and presence portions of the survey asked questions about group discussion and collaboration on projects. This overlap may have resulted in measuring some of the same aspects of group work. However, multicollinearity tests show that variance inflation factors for these variables fall well below the common values used to detect multicollinearity. A correlation analysis shows a correlation coefficient of .370 (see Appendix B), which is

also well below the .80 mark commonly used to indicate multicollinearity through correlation (Berry & Feldman, 1985; O'Brien, 2007).

Collaborative Effectiveness. One option would be to create a new variable, collaborative effectiveness, which looks at the availability of co-operative work as well as students' comfort in working with others in mediated environments. This would take some of the aspects of both co-operative work and social presence and provide a better measure of how effective students perceive the collaborative elements of the course to be. Since both variables have some overlap, yet fall short of measuring the true effectiveness of collaborative learning strategies, it is important to consider them together. A student who feels comfortable participating in a shared learning environment but has little opportunity to do so will likely be dissatisfied with the experience. Likewise, a student who is required to participate in group work but does not feel at ease in the environment will not learn much either. In the end, a collaborative effectiveness variable would be valuable, specifically in a mediated environment, to measure if the environment is making students feel connected enough to work together and giving them adequate opportunity to do so.

Class Rank

Class rank (i.e. freshman, sophomore, junior, senior, graduate student) also turned out to be a significant positive predictor of quality of course and instructor. Students who were farther in their educational career likely were more focused on their choices of courses and had selected courses they were more likely to enjoy or find useful. It is also likely that students who had been in college longer had achieved a level of maturity in recognizing course expectations and assessing course quality through taking a larger number of college courses.

Authentic Assessment

Due to a lack of literature on how authentic assessment is being accomplished in classes using a mediated environment as an instructional tool, open-ended questions were used in this study to evaluate what kinds of assessment were being used and which of these students found to be most accurate in gauging their performance in classes. Since Second Life was only a component of the class in most cases, a majority of the responses reflected forms of assessment conducted outside of Second Life. This resulted in a variety of answers representing many different assessment methods.

Many students believed that the tests they were given were accurate assessments of what they had learned. However, others felt that test questions were not at all like what they had seen in previous course readings or activities. It is important for instructors to be clear about what they expect out of their students and to design assessment measures that examine the students' progress in reaching those expectations. Exams that address concepts that students have not been in contact with mark a real problem in the realm of assessment.

Students also voiced that outside assignments were the best measure of their performance and felt that quick and frequent feedback was one of the most useful aspects in understanding course objectives and figuring out their shortcomings. Some of the students talked about how the outside assignments were the best in accurately assessing whether students had the ability to apply the knowledge in the real world. Outside assignments offer a helpful alternative to standard testing methods. Assignments may offer more specialized and concept-specific assessment measures than exams that rely more on simple recall. Assessments that are more effective in measuring the students' ability to apply knowledge give students and instructors a better

idea of how well the content is really understood and whether the knowledge can be successfully applied in the context in which it is meant to be used.

Based on previous research and the responses to the open-ended questions in this study, a few new questions come to mind that might prove useful in developing a scale to measure authentic assessment:

- Did the tests and assignments in this class accurately measure what you learned in this class?
- Did you feel that you had course-related knowledge that was not measured by the tests and assignments?
- Were you given the chance to prove what you had learned in this class?
- Were you asked to demonstrate abilities that were not taught in this class?

Further development of this scale for use with virtual worlds will likely require more identification of how assessment is taking place in virtual worlds. Future research will need to see if traditional assessment methods are being adapted to virtual worlds or if new forms of assessment are being created in the virtual world itself.

Generative Learning Strategies

Open-ended questions were also used to help assess what kind of learning strategies were being used in these courses and if those strategies were generative in nature. Generative learning strategies require students to be actively involved in building a product through which they better understand the content of the course. Many of the respondents discussed various ways in which they created something in their classes that helped them through the learning progress. Creation of concept maps, web sites, or scenarios in Second Life all represent ways in which generative learning can take place and took place in these classes. The wealth of responses indicating that

such creative activities are taking place and are important to students indicates that this is a valuable area of research particularly to mediated classes.

Second Life provides an exciting new way to incorporate generative learning activities into the curriculum. Not only can students create objects of learning in the virtual environment, they can manipulate the environment itself. As courses move to more mediated environments, this distinction should be an advantage for both instructor and student. Each class has specific needs for the environment and virtual environments no longer force the instructor to adjust to specifics of a brick and mortar classroom. A class on anatomy can now take place inside a body, a business class can run a virtual business, or a journalism class can interview avatars from all over the world and create news videos from events that take place in virtual worlds. Ways of incorporating generative learning strategies need to be considered by instructors in mediated environments in order to effectively utilize the tools available to them. One of the benefits of this type of learning comes in the form of a product that students can refer to when they need to refresh their learning or can share with later students, providing those students with something to build upon.

In order to measure generative learning strategies in the future, the following questions, derived from previous research and this study's responses to open-ended questions, may provide the basis for a generative learning strategies scale:

- Did you create a product that helped you learn in this class?
- At the end of this class, did you have something tangible that represented the results of your learning?
- If you were to talk about this class with someone else, would you have something you could show them that embodied what you learned?

As more research is completed in virtual worlds these scales may be developed to incorporate more ideas about how virtual worlds are creating new generative learning possibilities.

Applications for Instructors

This study indicates authentic learning context, presence, and to some degree, student responsibility and initiative are key considerations to students who participate in courses that use Second Life as an instructional tool. Instructors who attempt to teach with Second Life should keep these concepts in mind when designing learning activities for their students. The creative nature of Second Life allows for countless methods of applying these ideas to class experiences. The ability to adapt to specific needs of individual instructors improves the likelihood that Second Life, and similar virtual worlds will diffuse among higher education instructors.

In terms of authentic learning context, instructors may be tempted to create buildings and environments that look like the real world, but it is much more effective to focus on creating situations that resemble the real world, no matter what the structure looks like. In this study, students from the financial accounting class discussed ways in which seeing the accounting concepts at work in Second Life helped them better understand how those concepts could be applied in real life. Journalism students may interview an avatar shaped like a bumblebee as if they were a real person. The appearance of the avatar is not nearly as important as the experience gained from interviewing. A film student may make a short movie in a virtual world that has little in common with real life in terms of settings and characters, but the shots selected and the camera movements are the real takeaways for film students once they begin to apply their craft in reality. The possibilities are endless for re-creating situations in Second Life

and, as long as the focus is on learning something authentic, the background can be manipulated into whatever may spark student interest.

Addressing the idea of presence is also important to integrating Second Life into instruction. For distance education classes, virtual worlds hold tremendous potential for providing a place where synchronous activities can take place. Distance students can take classes in much the same way as traditional students, participating in live discussions, asking for help or offering help to other students, meeting with professors, and completing projects with members of a group. This offers a vast improvement over distance-course relationships that exist mostly in text. Instructors must take advantage of possibilities for interaction by designing group activities, facilitating discussions, and being available to work with students. Increased presence also has appeal beyond the distance student. Traditional students may also feel more comfortable asking for help in mediated situations. Asking a question in a large lecture hall may intimidate many people, while typing the question during a virtual class may alleviate some of that that anxiety. Encouraging students to be more comfortable interacting in their classes opens up the learner to more engagement opportunities. These opportunities give students the chance to work out ideas with others, creating a solid foundation for understanding course content.

Finally, the true responsibility lies in the hands of the student. Students must be put in the position where, given the appropriate effort, they will succeed. Instructors in Second Life should make use of the constant availability of virtual worlds. Designing learning scenarios that can be accessed at any time gives students the ability to put in as much practice as they deem necessary. Assignments that tap into student creativity

such as making machinima (virtual movies), creating virtual art or architecture, designing and implementing interactive scenarios, or participating in role-playing put students at the center of learning and encourage them to explore and experience different types of learning. In a virtual world, where boundaries are defined by imagination, students with real initiative can push well beyond traditional modes of thinking.

Theoretical Implications

The results of this study provide valuable information to the understanding of virtual worlds in the classroom and the application of constructivist theory using virtual worlds. The value placed on authentic learning context by students in this study shows there is concern for distribution of information in ways that are applicable to the real world as evidenced in previous literature (Brown, Collins and Duguid 1989; Resnick, 1987; Sherwood, Kinzer, Hasselbring, and Bransford, 1987). Virtual worlds offer an opportunity to close the gap between learning that takes place in school and the real world (Resnick, 1987). Virtual worlds can negotiate some of the problems Resnick points out by providing more possibilities for social interaction, manipulation of tools, more connections to real people and events, and focus on situation-specific knowledge. Students are concerned about how the learning that goes on in their classes can be applied to the real world and indicated in this study that providing a more authentic learning context improves their approach and satisfaction with the course.

This study also notes the significance of presence in improving student perceptions of the course. This confirms previous studies in which higher levels of presence were found to positively affect course performance (Balakrishnan and Pierre, 2007; Gunwardena & Zittle, 1997; Lombard & Ditton, 1997; Tu, 2002), showing this is

still the case in courses with a virtual world component. This also backs up several claims made concerning the importance of strong social elements to users of virtual worlds (Heeter, 1992; Lombard & Ditton, 1997; Mikropoulos, 2006). Presence should be a key concern for anyone pursuing research in the use of any virtual environments for learning purposes. Contrary to what previous researchers have suggested (Collins, Brown, & Newman, 1990; Grabinger, Dunlap, and Duffield, 1997; Roth, 1990), cooperative support did not show a positive effect on student-perceived learning outcomes. However, as discussed earlier, this may require a some adjustments to the method in order to detect co-operative supports true role in learning.

Moving forward, constructivist theorists should attempt to find more concrete methods to enhance constructivist uses of virtual worlds in course activities. Further research is needed to better define what practices may work the best in incorporating contstructivist concepts into curriculum. Constructivist theory needs a great deal of research on uses of virtual worlds in order to expand the current range of theory to include this kind of technology. Researchers need to remain dedicated to understanding both student and instructor perspectives in this area. This study represents one of the first to look at student perceptions and, though difficult to attain, found valuable results that show how students are coming to understand and work with this technology. Expanding constructivist theory to look at and take advantage of all the tools available will provide important benefits to both student and instructors at all levels.

Limitations and Future Research

As mentioned earlier, this research does have some limitations. First, Second Life was only one of the tools used in most of the classes that made up the sample. As the sample was being assembled, it became clear that this was the dominant way in which

Second Life was being used. With no universal list of who is using Second Life in the classroom at this point, it was difficult to identify and access students who fit the sample criteria. The results of this research reflect student perceptions of constructivist concepts applied in classes with some virtual experience and not classes taking place completely in virtual worlds. Current efforts in improving the educational appeal of Second Life by Linden Lab itself should make identification and access to Second Life courses easier in the future.

Second, a large portion of the sample consisted of students from one financial accounting class. Efforts were made in the analysis to make sure this did not seriously alter the results and so many insights from one class proved to be valuable in understanding which learning strategies and forms of assessment were most valued. Finally, it should be noted that this is one of the first studies in this area to attempt a large survey of a population of students using Second Life in their coursework. As with all early attempts, many ideas and methods can be improved upon and this will hopefully provide a building block for further research in this important area. Also, despite efforts directing students to focus their answers on the use of Second Life, it is possible students may have forgotten this and answered some of the questions based on their interactions with other tools they used in the course, due to question wording.

Mediated environments, specifically virtual environments, are becoming more and more prevalent in the realm of higher education and are interesting and important subjects of research. Researchers need to look at ways to improve the quality of these mediated environments to ensure that students are getting, at minimum, an education comparable to students in the traditional classroom. Hopefully, this research will give

instructors insight on how to incorporate a variety of tools and ideas into their courses, so they will create the optimal learning environment for their students. In order to move forward, some areas of research need attention and are ideal for future efforts.

A deeper look into how collaboration plays a part in student learning outcomes is appropriate following the results of this study. By refining the co-operative support and social presence scale used in this study or through development of the collaborative effectiveness variable that has been suggested, researchers must better understand how to make sure students are comfortable in a mediated setting and what collaborative learning strategies can be best be utilized in mediated classes. Through case studies of successful approaches and surveys of various classes using collaborative methods, more knowledge about the effect collaboration has on student learning outcomes can provide greater insight into how course designers can incorporate collaborative strategies into their curriculum effectively.

This study did not address the technical difficulties associated with incorporating Second Life into a course. However, some of the responses to the open-ended questions indicated that the steep learning curve associated with using Second Life in learning activities could be a barrier to student and faculty acceptance of virtual world learning. Further research should be devoted to ways in which this learning curve can be negotiated for all involved in the learning process.

Continuation of the measurement of student perceptions of mediated environments is vital to the development of this field. So much of the current research on mediated environments in education, particularly virtual worlds in education, focuses on the instructor’s perspective or case studies with limited student input. While

instructor-based research is no doubt important, it leaves out the learner's perspective on how effective these methods are in the learning process. Though it is often hard to find and access students who are taking classes using virtual worlds as a tool, the number of classes using virtual worlds is growing and they are becoming easier to identify. Future work in this area needs to examine how to create effective assessment methods and generative learning strategies that take full advantage of the characteristics of virtual worlds. Studies should also examine how different ways of using virtual worlds can improve the authentic learning context and student responsibility and initiative aspects of computer-mediated classes. This is certainly an exciting time for research in virtual worlds as interest in its uses as an educational tool continues to grow. There is great potential for virtual worlds to be a major factor in the future of higher education. Further research will undoubtedly find ways to make the most of all the positive features virtual worlds have to offer the educational community.

APPENDIX A
SURVEY INSTRUMENT

Informed Consent This survey is being conducted by West Bowers, a PhD student in the College of Journalism & Communications at the University of Florida. I would like your consent to take part in an academic study to better understand how college students feel about their experience using Second Life in a class. Please make sure responses reflect your use of Second Life in this course. You are being asked to take a short questionnaire that should only take approximately 20 minutes of your time. Your participation is completely voluntary, and you may decline to participate. You may skip any question that you do not wish to answer. You may also discontinue participation at any time without consequence. There is no penalty for not participating in this survey. Compensation is not provided. There are no direct benefits to you for participating in the study. This survey poses no risk for you because your responses are completely anonymous. You will not be identified, emails and IP addresses will not be collected, and neither that nor other identifying information will be connected to your responses. If you have any questions about this study, please feel free to contact West Bowers, PhD student, at: kwbowers@ufl.edu or my supervisor, Dr. Johanna Cleary, assistant professor of Journalism, at: jcleary@jou.ufl.edu. For questions regarding your rights as a research participant, you may contact the IRB at (352) 392-0433 or P.O. Box 112250, Gainesville, Florida 32611. Clicking "yes" below serves as proof of your willingness to be a participant. By clicking “yes below, you also certify that you are at least 18 years of age. Thank you for your help. I voluntarily agree to participate in this study.

- ❍ I voluntarily agree to participate in this study (1)
- ❍ I do not agree to participate in this study (2)

If I do not agree to participa... Is Selected, Then Skip To End of Survey

Throughout this survey, the words course and class are used to mean the unit of instruction in which you are currently enrolled that is using Second Life. For example, a class or course may be called ECON 101 - Introduction to Economics or STAT 2400 - Advanced Statistics for Social Sciences. When answering the questions, be sure to refer only to the class from which you received this survey.

1. In what country are you going to school?

2. In what academic discipline is this course?

- ❍ Anthropology (1)
- ❍ Archeology (2)
- ❍ Architecture (3)
- ❍ Art (4)
- ❍ Astronomy (5)
- ❍ Biology (6)
- ❍ Business (7)
- ❍ Chemistry (8)
- ❍ Communication (9)
- ❍ Computer Science (10)
- ❍ Cultural Studies (11)
- ❍ Dance (12)
- ❍ Economics (13)
- ❍ Engineering (14)
- ❍ English (15)
- ❍ Ergonomics (16)
- ❍ Ethnology (17)
- ❍ Film Studies (18)
- ❍ Forestry (19)
- ❍ Geography (20)
- ❍ History (21)
- ❍ Journalism (22)
- ❍ Law (23)
- ❍ Library and Information Science (24)
- ❍ Linguistics (25)
- ❍ Mathematics (26)
- ❍ Medicine (27)
- ❍ Military Science (28)
- ❍ Music (29)
- ❍ Philosophy (30)
- ❍ Physics (31)
- ❍ Planetary Science (32)
- ❍ Political Science (33)
- ❍ Psychology (34)
- ❍ Religious Studies (35)
- ❍ Sociology (36)
- ❍ Women's Studies (37)
- ❍ Other (38)

Answer If What academic discipline is this course in? Other Is Selected

If you selected other in the question above, Please describe the academic discipline this course is in.

3. What is the name of the course you are taking that uses Second Life?

4. Is this your first course using Second Life?
- ❍ Yes (1)
- ❍ No (2)

5. How would you best characterize the use of Second Life in the course you are taking?
- ❍ Class is conducted fully in Second Life (1)
- ❍ Class is conducted mostly in Second Life (2)
- ❍ Class is split evenly between Second Life and the real world (3)
- ❍ Class is conducted mostly in real world with Second Life used as only a small component (4)

6. How long have you been using Second Life?
- ❍ Less than 6 months (1)
- ❍ 6 months to 1 year (2)
- ❍ 1-2 years (3)
- ❍ more than 2 years (4)

7. What year are you in school?
- ❑ First year - Freshman (1)
- ❑ Second year - Sophomore (2)
- ❑ Third Year - Junior (3)
- ❑ Fourth Year - Senior (4)
- ❑ Graduate Student (5)
- ❑ Other (6)

8. What is your real life gender?
- ❍ Male (1)
- ❍ Female (2)

9. What is your age?

10. In this class...

	Never (1)	Seldom (2)	Sometimes (3)	Often (4)	Always (5)
I work with others. (1)	❍	❍	❍	❍	❍
I relate my work to others' work. (2)	❍	❍	❍	❍	❍
I share information with other students. (3)	❍	❍	❍	❍	❍
I discuss my ideas with other students. (4)	❍	❍	❍	❍	❍
I collaborate with other students in the class. (5)	❍	❍	❍	❍	❍
Group work is a part of my activities. (6)	❍	❍	❍	❍	❍

11. In this class...

	Never (1)	Seldom (2)	Sometimes (3)	Often (4)	Always (5)
I can relate what I learn to my life outside of university. (1)	❍	❍	❍	❍	❍
I am able to pursue topics that interest me. (2)	❍	❍	❍	❍	❍
I can connect my studies to my activities outside of class. (3)	❍	❍	❍	❍	❍
I apply my everyday experiences in class. (4)	❍	❍	❍	❍	❍
I link class work to my life outside of university. (5)	❍	❍	❍	❍	❍
I learn things about the world outside of university. (6)	❍	❍	❍	❍	❍
I apply my out-of-class experience. (7)	❍	❍	❍	❍	❍

12. In this class...

	Never (1)	Seldom (2)	Sometimes (3)	Often (4)	Always (5)
I study real cases related to the class. (1)	❍	❍	❍	❍	❍
I use real facts in class activities. (2)	❍	❍	❍	❍	❍
I work on assignments that deal with real-world information. (3)	❍	❍	❍	❍	❍
I work with real examples. (4)	❍	❍	❍	❍	❍
I enter the real world of the topic of study. (5)	❍	❍	❍	❍	❍

13. In this class...

	Never (1)	Seldom (2)	Sometimes (3)	Often (4)	Always (5)
I explore my own strategies for learning. (1)	❍	❍	❍	❍	❍
I seek my own answers. (2)	❍	❍	❍	❍	❍
I solve my own problems. (3)	❍	❍	❍	❍	❍

14. In this class...

	Never (1)	Seldom (2)	Sometimes (3)	Often (4)	Always (5)
I make decisions about my learning. (1)	❍	❍	❍	❍	❍
I work during times that I find convenient. (2)	❍	❍	❍	❍	❍
I am in control of my learning. (3)	❍	❍	❍	❍	❍
I play an important role in my learning. (4)	❍	❍	❍	❍	❍
I approach learning in my own way. (5)	❍	❍	❍	❍	❍

15. In this class...

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Getting to know other course participants gave me a sense of belonging in the course. (1)	❍	❍	❍	❍	❍
I was able to form distinct impressions of some course participants. (2)	❍	❍	❍	❍	❍
Online or web-based communication is an excellent medium for social interaction. (3)	❍	❍	❍	❍	❍
I felt comfortable conversing through the online medium. (4)	❍	❍	❍	❍	❍
I felt comfortable participating in the course discussions. (5)	❍	❍	❍	❍	❍
I felt comfortable interacting with other course participants. (6)	❍	❍	❍	❍	❍
I felt	❍	❍	❍	❍	❍

comfortable disagreeing with other course participants while still maintaining a sense of trust. (7)					
I felt that my point of view was acknowledged by other course participants. (8)	❍	❍	❍	❍	❍
Online discussions help me to develop a sense of collaboration. (9)	❍	❍	❍	❍	❍

16. In this class...

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I frequently did very good work on projects, assignments, problems and/or learning activities for this course. (1)	❍	❍	❍	❍	❍
I spent a lot of time doing tasks, projects and/or assignments, and my instructor judged my work as high quality. (2)	❍	❍	❍	❍	❍
I put a great deal of effort and time into this course, and it has paid off - I believe that I have done very well overall. (3)	❍	❍	❍	❍	❍

17. In this class...

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Compared to what I knew before I took this course, I learned a lot. (1)	❍	❍	❍	❍	❍
I learned a lot in this course. (2)	❍	❍	❍	❍	❍
Looking back to when this course began, I have made a big improvement in my skills and knowledge in this subject. (3)	❍	❍	❍	❍	❍
I learned very little in this course. (4)	❍	❍	❍	❍	❍
I did not learn much as a result of taking this course. (5)	❍	❍	❍	❍	❍

18. In this class...

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I am dissatisfied with this course. (1)	❍	❍	❍	❍	❍
This course was a waste of time and money. (2)	❍	❍	❍	❍	❍
I am very satisfied with this course. (3)	❍	❍	❍	❍	❍

19. In this class...

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Overall, I would rate the quality of this course as outstanding. (1)	❍	❍	❍	❍	❍
Overall, I would rate this instructor as outstanding. (2)	❍	❍	❍	❍	❍
Overall, I would recommend this instructor to others. (3)	❍	❍	❍	❍	❍

20. Which forms of grading did you find to be the most useful in measuring your performance in the course and learning of the content?

21. What types of activities did you participate in as part of the requirements for this course?

22. Which of these activities did you find to be the most helpful in terms of helping you perform well in the course and learn the material?

APPENDIX B
CORRELATION MATRIX FOR INDEPENDENT VARIABLES

		SRI	ALC	COS	PRE
Student responsibility and initiative (SRI)	Pearson correlation	1	.325	.033	.131
	Sig. (2-tailed)		.000	.448	.001
	N	634	607	516	602
Authentic learning context (ALC)	Pearson correlation	.325	1	.376	.443
	Sig. (2-tailed)	.000		.000	.000
	N	607	620	506	587
Co-operative support (COS)	Pearson correlation	.033	.376	1	.370
	Sig. (2-tailed)	.448	.000		.000
	N	516	506	526	496
Presence (PRE)	Pearson correlation	.131	.443	.370	1
	Sig. (2-tailed)	.001	.000	.000	
	N	602	587	496	612

LIST OF REFERENCES

Abrami, P. (2001). Improving judgments about teaching effectiveness using teacher rating forms. *New Directions for Institutional Research*, 109, 59–87.

Abrami, P., d'Apollonia, S., & Cohen, P. (1990). Validity of student ratings of instruction: What we know and what we do not. *Journal of Educational Psychology*, *82*(2), 219–231.

Adams, T. & Cleary, J., (2007). Surfable surveys: Using Web-based technology to reach newsroom respondents, *Electronic News, 1*(2), 103–120.

Andrews, D., Nonnecke, B., Preece, J. (2003) Electronic survey methodology: A case study in reaching hard to involve Internet users. *International Journal of Human-Computer Interaction*, *16*(2), 185–210.

Arthur, J., Tubre´, T., Paul, D., & Edens, P. (2003). Teaching effectiveness: The relationship between reaction and learning evaluation criteria. *Educational Psychology*, *23*(3), 275–285.

Anthes, G. (2007, December 3). Second Life: Is there any there there? *Computerworlds, 41*(49)*,* 30–37.

Antonacci, D. M., & Modaress, N. (2005, February). *Second Life: The educational possibilities of a massively multiplayer virtual world (MMVW)*. Paper presented at the EDUCAUSE Southwest Regional Conference, Austin, TX. Presentation outline retrieved from http://www2.kumc.edu/ir/tlt/SLEDUCAUSESW2005 /SLPresentationOutline.htm

Appel, J. (2006, November 10). 'Second Life' develops education following. *eSchool News*. Retrieved from http://www.eschoolnews.com/2006/11/10/second-life-develops-education-following/

Aragon, S. R. (2003). Creating social presence in online environments. *New Directions for Adult and Continuing Education* (100), 57–68.

Au, W. J. (2008). What is Second Life. *Second Fest*, from http://www.guardian.co.uk/secondfest/story/ 0,,2100568,00.html

Bannan-Ritland, B. (2002). Computer-mediated communication, elearning, and interactivity. *Quarterly Review of Distance Education*, 3(2), 161–179.

Baker, S. C., Wentz, R. K., & Woods, M. M. (2009). Using Virtual Worlds in Education: Second Life as an Educational Tool. *Teaching of Psychology, 36*(1), 59–64.

Balakrishnan, B. & Pierre, K. (2007). *Towards a human-centered approach towards instructional technology: Role of presence and engagement on student satisfaction in online courses*. Paper presented at the annual conference of the International Communication Association, San Francisco, CA.

Bannan-Ritland, B. (2002). Computer-mediated communication, elearning, and interactivity. *Quarterly Review of Distance Education, 3*(2), 161–179.

Barab, S. A., Hay, K. E., Barnett, M., & Keating, T. (2000). Virtual solar system project: Building understanding through model building. *Journal of Research in Science Teaching, 37*(7), 719–756.

Barab, S. A., Thomas, M., Dodge, T., Catrteaux, R., & Tuzan, H. (2005). Making learning fun: Quest Atlantis, a game without guns. *Educational Technology Research and Development, 53*(1), 86–107.

Bartle, R. (1990). Interactive multi-user computer games. Retrieved from http://www.mud.co.uk/richard/imucg.htm

Beck, D., Fishwick, P., Kamhawi, R., Coffey, A. J., Henderson, J., & Hamilton, B. (2009, August). *Synthesizing presence: A cross-disciplinary review of the literature*. Paper presented at the Annual Meeting of the Association of Educators in Journalism and Mass Communication, Boston, MA.

Bennett, L. (2005). Guidelines for using technology in the social studies classroom. *The Social Studies, 1*, 38–40.

Bowers, K. W., Ragas, M. W., & Neely, J. C. (2009). Assessing the value of virtual worlds for post-secondary instructors: A survey of innovators, early adopters and the early majority in Second Life. *International Journal of Humanities and Social Sciences, 3*(1), 40–50.

Berliner, D. (1991). What's all the fuss about instructional time? In M. Ben-Peretz & R. Bromme (Eds.), The nature of time in schools: Theoretical concepts, practitioner perceptions. New York: Teachers College Press.

Berry, W.D., & Feldman, S. (1985). *Multiple Regression in Practice.* Beverly Hills, CA: Sage Publications, Inc.

Bransford, J. D., Sherwood, R., Hasselbring, T., Kinzer, C., & Williams, S. (1990). Anchored instruction: why we need it and how technology can help. In D. Nix & R. Spiro (Eds.), *Cognition, education, and multimedia: Exploring ideas in high technology* (pp. 115–142). Hillsdale, NJ: Lawrence Erlbaum.

Bregman, A., & Haythornthwaite, C. (2003). Radicals of presentation: Visibility, relation, and co-presence in persistent conversation. *New Media and Society, 5*(1), 117–140.

Brooks, J. G., & Brooks, M. G. (1993). *In search of understanding: The case for constructivist classrooms*. Alexandria, VA: Association for Supervision and Curriculum Development.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32–42.

Brown, J. S., & Adler, R. P. (2008). Minds on fire: Open education, the long tail and learning 2.0. *EDUCAUSE Review, 43*(1), 16–32.

Bugeja, M. J. (2007). Second thoughts about Second Life. *The Chronicle of Higher Education, 54*(3), C1.

Calongne, C., & Hiles, J. (2007, April). *Blended realities: A virtual tour of education in Second Life*. Paper from the Technology, Colleges & Community (TCC) 12th Annual Worldwide Online Conference. Retrieved from http://edumuve.com/blended/BlendedRealitiesCalongneHiles.pdf

Cheal, C. (2007). Second Life: Hype or hyperlearning? *On the Horizon, 15*(4), 204–210.

Childress, M., & Braswell, R. (2006). Using massively multiplayer online role-playing games for online learning. *Distance Education, 27*(2), 187.

Clark, D. (2008, April 3). Virtual world gets another life. *Wall Street Journal*. Retrieved from http://online.wsj.com/article/SB120719726445485981.html

Clayson, D., Frost, T., & Sheffet, M. (2006). Grades and the student evaluation of instruction: A test of the reciprocity effect. *Academy of Management Learning and Education*, *5*(1), 52–65.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159.

Cohen, P. (1981). Student ratings of instruction and student achievement. A meta-analysis of multisection validity studies. *Review of Educational Research, 51*(3), 281–309.

Coffman, T., & Klinger, M. B. (2007). Utilizing virtual worlds in education: The implications for practice. *International Journal of Social Sciences, 2*(1), 29–33.

Collins, A. (1995). *Learning communities*. Paper presented at the American Educational Research Association, San Francisco, CA.

Collins, A., Brown, J. S., & Holum, A. (1991). Cognitive apprenticeship: making thinking visible. *American Educator*, Winter(6–11), 38–46.

Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive apprenticeship: teaching the crafts of reading, writing, and mathematics. In L. B. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser (Vol. 453–494)*. Hillsdale, NJ: Lawrence Erlbaum.

Conklin, M. S. (2007). *101 uses for Second Life in the college classroom.* Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.133.9588&rep=rep1&type=pdf

Conole, G., de Laat, M., Dillon, T., & Darby, J. (2008). 'Disruptive technologies', 'pedagogical innovation': What's new? Findings from an in-depth study of students' use and perception of technology. *Computers & Education, 50*(2), 511–524.

Cross, K.P. (1998). What do we know about students' learning and how do we know it?. Paper presented at the AAHE National Conference on Higher Education, Atlanta, GA.

Curtis, P. (1996). Mudding: social phenomena in text-based virtual realities. In P. Ludlow (Ed.), *High noon on the electronic frontier: Conceptual issues in cyberspace* (pp. 347–373). Cambridge, MA: The MIT Press.

Daiute, C., & Dalton, B. (1989). *Apprenticeship between peers learning to write.* Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

De Castell, S., & Jensen, J. (2007). *Worlds in play: International perspectives on digital games research.* New York, NY: Basic Initiative, Peter Lang Publishing.

Delwiche, A. (2006). Massively multiplayer online games (MMOs) in the new media classroom. *Educational Technology and Society, 9*(3), 160–172.

Dow, M. J. (2008). Implications of social presence for online learning: a case study of MLS students. *Journal of Education for Library and Information Science, 49*(4), 231–242.

Emery, C., Kramer, T., & Tian, R. (2003). Return to academic standards: A critique of student evaluations of teaching effectiveness. *Quality Assurance in Education*, *11*(1), 37–46.

Ewing, J. (2000). Enhancement of online and offline student learning. *Education Media International, 37*(4), 206–217.

Feldman, K. (1989). The association between student ratings of specific instructional dimensions and student achievement: Refining an extending the synthesis of data from multisection validity studies. *Research in Higher Education*, 30, 583–645.

Fish, M. C., & Dane, E. (2000). The classroom systems observation scale: Development of an instrument to assess classrooms using a systems perspective. *Learning Environments Research, 3*, 67–92.

Foreman, J. (2003). Next-generation educational technology versus the lecture. *EDUCAUSE Review, 38*(4), 12–22.

Foster, A. L. (2005, September 30). The avatars of research. *The Chronicle of Higher Education*. Retrieved from http://chronicle.com/weekly/v52/i06/06a03501.htm

Foster, A. L. (2007, September 21). Professor avatar. *The Chronicle of Higher Education*. Retrieved from http://chronicle.com/weekly/v54/i04/04a02401.htm

Franceschi, K., Lee, R. M., Zanakis, S. H., & Hinds, D. (2009). Engaging group e-learning in virtual worlds. *Journal of Management Information Systems, 26*(1), 73–100.

Fraser, B. J. (1986). *Classroom environment*. London: Croom Helm.

Frederiksen, J. R., & Collins, A. (1989). A systems approach to educational testing. *Educational Researcher, 18*, 27–32.

Frick, T., Chadha, R., Watson, C., Wang, Y., & Green, P. (2009). College student perceptions of teaching and learning quality. *Educational Technology Research and Development, 57*(5), 705–720.

Fricker, R. D., & Schonlau, M. (2002) Advantages and disadvantages of Internet research surveys: Evidence form the literature. *Field Methods, 14,* 247–367.

Galagan, P. (2006). Second that. *T+D, 62*(2), 34–37.

George, D., & Mallery, P. (2001). *SPSS for Windows step by step: A simple guide and reference 10.0 update* (3rd ed.). Toronto: Allyn and Bacon.

Gibbons, A.S., Bunderson, C.V., Olsen, J.B. & Roberston, J. (1995). Work models: Still beyond instructional objectives. *Machine-Mediated Learning, 5*(3&4), 221–236.

Grabinger, S., Dunlap, J. C., & Duffield, J. A. (1997). Rich environments for active learning in action: Problem-based learning. *ALT-J, Research in Learning Technology, 5*(2), 5–17.

Grabinger, R. S., & Dunlap, J. C. (2000). Rich environments for active learning: A definition. In D. Squires, G. Conole, & G. Jacobs (Eds.), The changing face of learning technology (pp. 8–38). Cardiff: University of Wales Press.

Graves, L. (2008). A second life for higher ed. *U.S. News & World report, 144*(2), 49–50.

Gunawardena, C. N. & Zittle, F. J. (1997) Social presence as a predictor of satisfaction within a Computer-mediated Conferencing Environment, *American Journal of Distance Education*, *11*(3), 8–26.

Gurney, B. (1989, March). *Constructivism and professional development: A stereoscopic view.* Paper presented at the 62nd Annual Meeting of the National Association for Research in Science Teaching, San Francisco, CA.

Heeter, C. (1992). Being there: The subjective experience of presence. *Presence: Teleoperators and Virtual Environments, 1*(2), 262–271.

Hirumi, A. (2002). Student-centered, technology-rich learning environments (SCenTRLE): Operationalizing constructivist approaches to teaching and learning. *Journal of Technology and Teacher Education, 10*(4), 497–537.

Hu, S., & Kuh, G. D. (2001, April). *Computing experience and good practices in undergraduate education: Does the degree of campus "wiredness" matter?* Paper presented at the Annual Meeting of the American Educational Research Association, Seattle, WA.

Jarmon, L., Traphagan, T., Mayrath, M., & Trivedi, A. (2009). Virtual world teaching, experiential learning, and assessment: An interdisciplinary communication course in Second Life. *Computers & Education, 53*, 169–182.

Jegede, O., Fraser, B. J., & Fisher, D. L. (1998, March). *The Distance and Open Learning Environment Scale: Its development, validation and use*. Paper presented at the 69th Annual Meeting of the National Association for Research in Science Teaching, San Diego, CA.

Jennings, N., & Collins, C. (2008). Virtual or virtually U: Educational institutions in Second Life. *International Journal of Social Sciences, 2*(3), 180–186.

Johnson, L. F., & Levine, A. H. (2008). Virtual worlds: Inherently immersive, highly social learning spaces. *Theory into Practice, 47*, 161–170.

Jonassen, D. H. (1992). Constructivism. In T. M. Duffy & D. H. Jonassen (Eds.), *Constructivism and the technology of instruction: A conversation* (pp. 1–16). Hillsdale, NJ: Erlbaum.

Jonassen, D. H. (1994). Thinking technology: Toward a constructivist design model. *Educational Technology, 34*(3), 34–37.

Jonassen, D. H. (1996). *Computers in the classroom: Mindtools for critical thinking*. Englewood Cliffs, NJ: Merrill.

Jonassen, D. H., Peck, K. L., & Wilson, B. G. (1999). *Learning with technology: A constructivist perspective*. Upper Saddle River, NJ: Merrill.

Juniu, S. (2006). Use of technology for constructivist learning in a performance assessment class. *Measurement in Physical Education and Exercise Science, 10*(1), 67–79.

Kafai, Y. B., & Harel, I. (1991). Learning through design and teaching: Exploring social and collaborative aspects of constructionism. In I. Harel & S. Papert (Eds.), Constructionism: Research reports and essays, 1985–1990 (pp. 85–109). Norwood, NJ: Ablex.

Kagima, L. K., & Hausafus, C. O. (2000). Integration of electronic communication in higher education: Contributions of faculty computer self-efficacy. *The Internet and Higher Education, 2*(4), 221–235.

Kapp, K. M., & Tony, O. D. (2010). *Learning in 3D: Adding a new dimension to enterprise learning and collaboration*. San Francisco: Pfeiffer.

Karagiorgi, Y., & Symeou, L. (2005). Translating constructivism into instructional design: Potential and limitations. *Educational Technology & Society, 8*(1), 17–27.

Kennedy, G., Krause, K.-L., Gray, K., Judd, T., Bennett, S., Maton, K.,…Bishop, A. (2006, December). Questioning the net generation: A collaborative project in Australian higher education. Paper presented at the 23rd Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education, Sydney, Australia.

Kirkpatrick, D. L. (1998). Evaluating training programs: The four levels. San Francisco: Berrett-Koehler.

Kirkpatrick, D. (2007, February 5). It's not a game. *Fortune, 155* (2), 56–62.

Koon, J., & Murray, H. (1995). Using multiple outcomes to validate student ratings of overall teacher effectiveness. *The Journal of Higher Education*, *66*(1), 61–81.

Kuh, G. D., & Hu, S. (2001). The relationships between computer and information technology use, student learning, and other college experiences. *Journal of College Student Development, 42*, 217–232.

Kuh, G. D., & Vesper, N. (2001). Do computers enhance or detract from student learning? *Research in Higher Education, 42,* 87–102.

Kulik, J. (2001). Student ratings: Validity, utility and controversy. New Directions for Institutional Research, *109*, 9–25.

Lazar, J. & Preece, J. (1999). Designing and implementing web-based surveys. *Journal of Computer Information Systems 39* (4), 63–67.

Leh, A. S. (2001) Computer-mediated communication and social presence in a distance learning environment. *International Journal of Educational Telecommunications*, *7*(2), 109–128.

Lenhart, A., Kahne, J., Middaugh, E., Macgill, A.R., Evans, C., & Vitak, J. (2008). *Teens, video games, and civics*. Retrieved from the Pew Internet & American Life Project Web site: http://www.pewinternet.org/

Linden Lab. (2008). The company. Retrieved from: http://lindenlab.com/about

Lombard, M., & Ditton, T. B. (1997). At the heart of it all: The concept of presence. *Journal of Computer-Mediated Communication, 3*(2).

Marsh, H. (1984). Students' evaluations of university teaching: Dimensionality, reliability, validity, potential biases, and utility. Journal of Educational Psychology, 76(5), 707–754.

Merrill, M. D. (2002). First principles of instruction. *Educational Technology Research and Development, 50*(3), 43–59.

Mikropoulos, T. A. (2006). Presence: A unique characteristic in educational virtual environments. *Virtual Reality, 10*, 197–206.

Miller, P. (2010). SLEDfaq – muve4edu. Retrieved from http://sites.google.com/site/muve4edu/sledfaq#TOC-Draft-Unofficial-SLED-FAQ-version-0

Moreno, R., & Mayer, R. E. (2004). Personalized messages that promote science learning in virtual environments. *Journal of Educational Psychology, 96*(1), 165–173.

Neely, J., Bowers, K. W., & Ragas, M. (2009, August). *Virtual possibilities: A constructivist examination of the educational applications of Second Life.* Paper presented at the Annual Meeting of the Association for Education in Journalism and Mass Communication, Boston, MA.

O'Brien, M. G., & Levy, R. M. (2008). Exploration through virtual reality: Encounters with the target culture. *The Canadian Modern Language Review, 64*(4), 663–691.

O'Brien, R.M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quantity and Quality, 41*, 673-690.

Oblinger, D. G., & Oblinger, J. L. (2005). *Educating the net generation* [An Educause e-book]. Retrieved from http://www.educause.edu/educatingthenetgen/

Ondrejka, C. (2008). Education unleashed: Participatory culture, education, and innovation in Second Life. In K. Salen (Ed.), *The ecology of games: Connecting youth, games, and learning* (pp. 229–252). Cambridge, MA: The MIT Press.

Palincsar, A. S., & Klenk, L. (1992). Fostering literacy learning in supportive contexts. *Journal of Learning Disabilities, 25*(4), 211–225.

Papert, S. (1991). Situating constructionism. In I. Harel & S. Papert (Eds.), *Constructionism: Research reports and essays, 1985–1990* (pp. 1–11). Norwood, NJ: Ablex.

Perkins, D.H., & Unger, C. (1999). Teaching and learning for understanding. In C.M. Reigeluth (Ed.), *Instructional design theories and models: A new paradigm of instructional theory* (vol. II) (pp. 91–114). Mahwah, NJ:Lawrence Erlbaum Associates.

Piaget, J. (1963). *The origins of intelligence in children*. New York: W.W. Norton.

Preimesberger, C. (2008). Giving schools a Second Life. *eWeek, 25*(7), 10.

Reigeluth, C. M. (1999). The elaboration theory: guidance for scope and sequence decisions. In C. M. Reigeluth (Ed.), *Instructional design theories and models: A new paradigm of instructional theory* (Vol. 2, pp. 425–453). Mahwah, NJ: Lawrence Erlbaum Associates.

Renaud, R., & Murray, H. (2004). Factorial validity of student ratings of instruction. Research in Higher Education, 46(8), 929–953.

Repman, J., Zinskie, C., & Carlson, R. D. (2005). Effective use of CMC tools in interactive online learning. *Computers in the Schools, 22(*1/2), 57–69.

Resnick, L. B. (1987). Learning in school and out. *Educational Researcher, 16*(9), 13–20.

Romano, D. M., & Brna, P. (2001). Presence and reflection in training: Support for learning to improve quality decision-making skills under time limitations. *CyberPsychology and Behavior, 4*(2), 265–277.

Roth, W.M. (1990, April). *Collaboration and constructivism in the science classroom.* Paper presented at the Annual Meeting of the American Educational Research Association, Boston, MA.

Sackmary, B. (1998). Internet survey research: Practices, problems, and prospects. *Proceedings of the American Marketing Association Summer Conference,* 41–49.

Schaefer, D.R., & Dillman, D.A. (1998). Development of a standard e-mail methodology: Results of an experiment. *Public Opinion Quarterly, 62,* 378–397.

Salen, K., & Zimmerman, E. (2004). *Rules of play: game design fundamentals*. Norwood, MA: MIT Press.

Scardamalia, M., & Bereiter, C. (1991). Higher levels of agency for children in knowledge building: a challenge for the design of new knowledge media. *The Journal of the Learning Sciences, 1*(1), 37–68.

Scardamalia, M., Bereiter, C., McLean, R. S., Swallow, J., & Woodruff, E. (1989). Computer-supported intentional learning environments. *Journal of Educational Computing Research, 5*(1), 51–68.

Sharpe, R., Benfield, G., Lessner, E., & DeCicco, E. (2005). *Final report: Scoping Study for the pedagogy strand of the JISC e-learning Programme.* Retrieved from JISC Web site: http://www.jisc.ac.uk/uploaded_documents/scoping%20study%20final%20report%20v4.1.doc.

Sherwood, R., Kinzer, C., Hasselbring, T., & Bransford, J. D. (1987). Macro-contexts for learning: Initial findings and issues. *Applied Cognitive Psychology, 1*, 93–108.

Slater, M., Usoh, M., & Steed, A. (1994). *Depth of presence in virtual environments*. Retrieved from CiteSeer^{x} Web site: http://citeseerx.ist.psu.edu

Slator, B. M., Borchert, O., Brandt, L., Chaput, H., Erickson, K., Groesbeck, G., … Vender, B. (2007). From dungeons to classrooms: The evolution of MUDs as learning environments. In C. Lakhmi, R. A. Tedman, & D. K. Tedman (Eds.), *Evolution of teaching and learning paradigms in intelligent environment* (pp. 119–159). Berlin, Germany: Springer.

Squires, D., Huitt, W., & Segars, J. (1983). Effective schools and classrooms: A research-based perspective. Alexandria, VA: Association for Supervision and Curriculum Development.

Steed, A., Slater, M., Sadagic, A., Bullock, A., & Tromp, J. (1999, March). *Leadership and collaboration in shared virtual environments*. Paper presented at the IEEE Virtual Reality Conference, Houston, TX.

Steinkueler, C. A. (2004). Learning in massively multiplayer online games. In Y. B. Kafai, W. A. Sandoval, N. Enyedy, A. S. Nixon, & F. Herrera (Eds.), *Proceedings of the 6th International Conference of the Learning Sciences* (pp. 521–528). Mahwah, NJ: Erlbaum.

Su, K. D. (2007). An integrated science course designed with information communication technologies to enhance university students' learning performance. *Computers & Education, 51*, 1365–1374.

Swan, K. P., Richardson, J. C., Ice, P., Garrison, D. R., Cleveland-Innes, M., & Arbaugh, J. B. (2008). Validating a measurement tool of presence in online communities of inquiry. *e-mentor, 2*(24). Retrieved from http://e-mentor.edu.pl/eng/

Swoboda, S. J., Muehlberger, N., Weitkunat, R. & Schneeweiss, S. (1997). Web-based surveys by direct mailing: An innovative way of collecting data. *Social Science Computer Review 15*(3).

Tam, M. (2000). Constructivism, instructional design, end technology: Implications for transforming distance learning. *Educational Technology & Society, 3*(2), 50–60.

Tu, C.H. (2002). The measurement of social presence in an online learning environment. *International Journal on E-Learning*, *1*(2), 34–45.

Twigg, C. A. (2003). Improving learning and reducing costs: New models for online learning. *EDUCAUSE Review, 38*(5), 29–38

Van Merriënboer, J.J.G. (1997). *Training complex cognitive skills.* Englewood Cliffs: Educational Technology Publications.

Von Wright, J. (1992). Reflections on reflection. *Learning and Instruction, 2*, 59–68.

Vygotsky, L. S., & Cole, M. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, Mass.: Harvard University Press.

Walker, S. L., & Fraser, B. J. (2005). Development and validation of an instrument for assessing distance education learning environments in higher education: The Distance Education Learning Environments Survey (DELES). *Learning*

Environments Research, 8, 289–308.
Wallace, R. M. (2003). Online learning in higher education: A review of research on interactions among teachers and students. *Education, Communication & Information, 3*(2), 241–280.

Warburton, S. (2009). Second Life in higher education: Assessing the potential for and the barriers to deploying virtual worlds in learning and teaching. *British Journal of Educational Technology, 40*(3), 414–426.

Warburton, S., & Perez-Garcia, M. (2009). 3D design and collaborationin massively multi-user virtual environments. In D. Russell (Ed.), *Cases on collaboration in virtual learning environments: processes and interactions* (pp. 27–41). Hershey, PA: IGI Global.

Wheeler, S. (2001). Information and communication technologies and the changing role of the teacher. *Journal of Educational Media, 26*(1), 7–17

Wiggins, G. (1989). A true test: Toward more authentic and equitable assessment. *Phi Delta Kappan, 70*, 703–713.

Williams, M. D., & Dodge, B. J. (1993, January). *Tracking and analyzing learner-computer interaction*. Paper presented at the Convention of the Association for Educational Communications and Technology Sponsored by the Research and Theory Division, New Orleans, LA.

Witmer, D. F., Colman, R. W., & Katzman, S. L. (1999). From paper-and-pencil to screen-and-keyboard. In S. Jones (Ed.), *Doing Internet research: Critical issues and methods for examining the Net* (pp. 145–162). Thousand Oaks, CA: Sage.

Wittrock, M. C. (1974). A generative model of mathematics learning. *Journal for Research in Mathematics Education, 5*(4), 181–196.

Yee, K., & Hargis, J. (2010). Second Life brought to life: A case usability in-world. In S. Mukerji (Ed.), *Cases on Technological Adaptibility and Translational Learning: Issues and Challenges* (pp. 203–217). New York: Information Science and Reference.

Yoon, S. W. “Examination of Member Behaviors, Group Processes, and Development-Shaping Forces of Virtual Learning Teams.” Unpublished doctoral dissertation, Department of Human Resource Education, University of Illinois, Urbana-Champaign, 2003.

Yun, G. W. & Trumbo, C.W. (2000). Comparative response to a survey executed by post, e-mail, & web form. *Journal of Computer-Mediated Communication 6(1).*

BIOGRAPHICAL SKETCH

Kevin Westmoreland Bowers was born in Jacksonville, Florida but grew up in Spartanburg, South Carolina and Gainesville, Florida. He received his Bachelor of Arts in dramatic arts and communication studies with a specialty in media studies from the University of North Carolina at Chapel Hill in 2002. He moved to Los Angeles to learn about the film and television industries. After completing his Master of Fine Arts in television production from Loyola Marymount University in 2005, he worked for a couple years in post-production, mostly for MTV reality shows. When the education bug bit him again, he moved back to Gainesville to pursue his true passion for teaching. He finished his doctoral degree in mass communication from the University of Florida in December of 2010 and is pursuing his interests in teaching about and researching new communication technologies and their uses in education.