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ACCEPTANCE

This dissertation, FACULTY PERCEPTIONS ABOUT VIRTUAL WORLD TECHNOLOGY: AFFORDANCES AND BARRIERS TO ADOPTION, by LINDA WIEDEMAN WOOD, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Doctor of Philosophy in the College of Education, Georgia State University.

The Dissertation Advisory Committee and the student's Department Chair, as representatives of the faculty, certify that this dissertation has met all standards of excellence and scholarship as determined by the faculty. The Dean of the College of Education concurs.

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ABSTRACT

FACULTY PERCEPTIONS ABOUT VIRTUAL WORLD TECHNOLOGY:
AFFORDANCES AND BARRIERS TO ADOPTION
by
Linda Wiedeman Wood

Providing instruction using different instructional delivery methods allows the learner to absorb content in a way that fits the individual learner. Today's students have grown up immersed in digital technology. However, many higher education faculty are still not speaking the same digital language as their students. The issue may be that the pedagogical and epistemological beliefs of faculty who are "digital immigrants" affect the teaching methods used in the higher education classroom today. The purpose of this mixed methods study was to explore design college faculty perceptions of the adoption of virtual world technology into the classroom. Diffusion and adoption theories, adoption models, and patterns of adoption provided a conceptual framework for this study. This mixed methods study collected data through a survey and post-survey interviews administered to faculty of 21 design colleges. The quantitative survey instrument included questions about the usage of technology, including virtual world technology, in the higher education classroom. A total of 309 faculty completed the survey. Descriptive statistics, including frequencies, means, and standard deviations were used in the analysis. A correlation analysis was performed to determine if there was a relationship between selected variables and the survey responses. Post-survey semi-structured interviews were conducted with 12 faculty participants who volunteered for the

interviews after participating in the survey. In this study, I used the constant comparative open coding hybrid method for the interview analysis.

The specific research question posed in this study was: What are the perceptions of design college faculty regarding the use of virtual world technology in their courses? Guiding questions included: (a) What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? (b) What are faculty perceptions of the affordances of using virtual world technology in the classroom? (c) What are faculty perceptions of the challenges of using virtual world technology in the classroom? In general, the results of this study indicate that while higher education faculty perceive that virtual world technology has the potential to be a useful teaching tool in the classroom, the faculty also perceive that they do not have the essential software and hardware support from their colleges to adopt this type of technology as a teaching tool in their courses.

FACULTY PERCEPTIONS ABOUT VIRTUAL WORLD TECHNOLOGY: AFFORDANCES AND BARRIERS TO ADOPTION

by

Linda Wiedeman Wood

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Today's students have been raised in an interactive, video-gaming world. Incorporating interactive virtual environments as a learning delivery method could possibly stimulate students who may otherwise be bored with the subject matter. Higher education institutions are challenged with providing adequate environments of learning to engage the "digital natives." Faculty teaching perhaps should examine their teaching methods to address the needs of today's college students. Since today's faculty are possibly "digital immigrants" (and some even "non-speakers") (Prensky, 2001), a concern could possibly include how incorporating virtual world technology into the classroom affects faculty. Higher education institutions should be concerned with faculty perceptions and beliefs and how those perceptions and beliefs affect faculty behavior in the classroom. Faculty perceptions potentially affect whether a new technology (such as virtual world technology) is adopted in the classroom.

Statement of the Problem

Providing instruction using different instructional delivery methods allows the learner to absorb instructional content in a way that fits the individual learner. Today's students have grown up immersed in digital technology. However, many higher education faculty are still not speaking the same digital language as their students. The issue may be that the pedagogical and epistemological beliefs of faculty who are "digital

immigrants" affect the teaching methods used in the higher education classroom today. Perhaps many students feel that they are more technologically savvy than the faculty teaching in the classroom.

Having spent over eighteen years in post-secondary education, I have observed first-hand the challenges higher education faculty encounter when new technologies are introduced. I have witnessed how faculty are expected to adopt and diffuse new technologies into the curriculum, affecting their teaching methodologies. In the past, some technologies were readily accepted and adopted by the faculty I worked with but some technologies were not. From my experience over the years, sometimes whether a new technology was adopted and diffused by a faculty member depended on whether that faculty member perceived the technology was the appropriate teaching tool for the class being taught. Other times, I observed that a faculty member might not adopt a new technology because he believed the old methods and technologies worked fine. The faculty member would question why should he change a teaching method that was already tested and working? My observations of the adoption and diffusion of technology by my faculty are inline with the literature reviewed for this study: individual teacher perceptions, beliefs, and attitudes affect technology adoption decisions due to their perceptions of the consequences of adopting the new technologies (Sugar, Crawley, & Fine, 2004).

When I first became the department chair of photography at a design college located in a large metropolitan area located in the southeastern United States, digital technology was just beginning to replace the traditional wet or analog technology (using chemicals to develop film, using an enlarger to expose the image on photographic paper,

and using a chemical bath to process photographic paper) in the commercial photography field. Most photography faculty members at my college at the time were in favor of retaining the use of film and wet processes in the photography curriculum. They were not embracive of digital photographic technologies in teaching photography. They believed the "traditional" film and wet darkroom processing methods of photography were the foundations of photography. They believed that photography had always been taught in the wet darkroom and the wet darkroom process should be preserved as a teaching method. As a result, it appeared that faculty resistance stemmed from epistemological beliefs, yet intertwined with pedagogical beliefs in such as way that they could not discern one from the other.

Eventually, industry professionals helped the faculty realize that the future of the commercial photography industry was in digital technologies versus the outdated analog wet darkroom processes. In addition, the faculty realized that they had been using digital photographic manipulation software since the early to mid-nineteen-nineties, understanding that the change to the digital darkroom should not be a difficult transition to make. Faculty development opportunities made the transition into the digital darkroom easier for the faculty, but faculty resistance against the digital technology was still prevalent. It was evident to me at the time that long-held beliefs by the faculty were intrinsic and difficult to change. The photography faculty were not (as Rogers, 2003, categorizes) "early adopters" of technology.

My experience with the digital conversion of the wet darkroom at my college and the subsequent faculty resistance accentuated the possibility that change is difficult for some people. Perceptions and beliefs affect the way people act (Pajares, 1992).

Perceptions can affect beliefs that influence a faculty member's performance and should be examined to determine why some faculty members adopt new technologies readily and others do not (Ertmer, 2005).

Rationale for the Study

Higher education institutions are challenged with the task of educating a technology savvy generation of students. Higher education institutions need to able and ready to meet the needs of the digital natives. Are most higher education institutions able or ready to train their faculty in using and incorporating virtual world technology into the classroom? Will the faculty be willing to forgo their legacy teaching methods in order to engage these digital natives?

Educators adhere to an educational philosophy (Brookfield, 1990). Behind the educational philosophy are the beliefs faculty hold (Lumpe & Chambers, 2001; Pajares, 1992; Sugar, Crawley, & Fine, 2004). Sugar, Crawley, and Fine (2004) state: "Teachers' technology beliefs are influenced by their teaching philosophy" (p. 202). The beliefs faculty hold regarding the use of technology in their teaching possibly stem from teaching theories, teaching methods, learning theories, learning methods, and learning styles (Pajares, 1992). Some of the literature reviewed in this study give thick descriptions of faculty perceptions, beliefs, and behavior (Albright, 1996; Johnson, Schwab & Foa, 1999; Novek, 1996; Weber, 2002; & Windschitl & Sahl, 2002). Other literature reviewed provides data supporting the adoption and diffusion of technology by faculty (Adams, 2002; Duncan, 2005; Grenier-Wither, 1999; Jacobsen, 1999; Rodriguez & Knuth, 2000; Rogers, 2003; & Straub, 2009). Faculty hold their own perceptions and

beliefs about teaching (Pajares, 1992). To understand why faculty hold certain perceptions and beliefs, we should consider immersing ourselves into their culture.

This research study focused on design college faculty perception of the use of virtual world technology in the higher education classroom. It is argued that "perception functions as a source of knowledge" (Lagerspetz, 2008, p. 197), and that perceptions can possibly lead to beliefs (Armstrong, 1993; Vision, 2008). Beliefs tend to be more firmly held, since they are perhaps based from experience and knowledge (Pajares, 1992), whereas perceptions can be more fleeting: "To perceive is, cognitively, just to think, to entertain propositions" (Smith, 2001, p. 287). Beliefs can influence perceptions (Pajares, 1992; Vision, 2008). Pajares states: "There is the self-fulfilling prophecy – beliefs influence perceptions that influence behaviors that are consistent with, and that reinforce, the original beliefs" (p. 317). Rokeach (1968, in Pajares, 1992) asserts that beliefs vary in strength: "the more central a belief, the more it will resist change" (p. 318). On the other hand, perceptions "are definite events that take place at definite instants and are then over" (Armstrong, 1993, p. 214).

Purpose of the Study and Research Questions

This research study explored design college faculty perceptions regarding the use of virtual world technology (such as a MUVE) in the classroom as a method of delivering course content. There are several definitions existing that assist in explaining the concept of virtual world technology. Virtual world technology includes software-based applications that simulate an environment. The notion of "presence and telepresence, which refers to the sense of being in an environment," lends itself to focusing on experiential, rather than the technological aspect (Steuer, 1992, p. 75). Steuer (1992)

further expands on the definition of presence and telepresence to provide a background of the concept of virtual reality:

> Presence refers to the natural perception of an environment, and 'telepresence' refers to the mediated perception of an environment. This environment can be either a temporally or spatially distant 'real' environment (for instance, a distant space viewed through a video camera), or an animated but non-existent virtual world synthesized by a computer (for instance, the animated 'world' created in a video game) (p. 78).

Instead of having "presence" in the real world (such as a 'brick and mortar' classroom) the virtual world allows us to have a "presence" in a world where the users create an environment online (via the Internet). The virtual world environment is a 3-D graphical representation of the world, created by the users of the virtual world (Au, 2008). Residents in the virtual world are avatars (characters created by the users to represent the user in the virtual world). The interaction between avatars in the virtual world is real-time. Users control their avatar with a computer keyboard and/or a computer mouse (Au, 2008). Bell (2008) describes virtual worlds as: "A synchronous, persistent network of people, represented as avatars, facilitated by networked computers" (p. 1). In essence:

> In a virtual world, we are inside an environment of pure information that we can see, hear, and touch. The technology itself is invisible, and carefully adapted to human activity so that we can behave naturally in this artificial world. We can create any imaginable environment and we can experience entirely new perspectives and capabilities within it. (Bricken, 1991, p. 1)

The central question posed for this study was the following: What are the perceptions of design college faculty regarding the use of virtual world technology in their courses? Guiding questions included: (a) What are faculty perceptions about virtual

world technology that potentially affect its adoption into the classroom? (b) What are faculty perceptions of the affordances of using virtual world technology in the classroom? and (c) What are faculty perceptions of the challenges of using virtual world technology in the classroom?

Conceptual Framework

The conceptual framework was derived from a review of the literature, which in turn, informed my study and assisted in crafting my research questions. The conceptual framework that guided this study provided a foundation for investigating faculty perceptions of adopting virtual world technology as a teaching method. This study explored design college faculty perceptions about the use of virtual world technology in the classroom as a method in delivering course content. Diffusion and adoption theories, adoption models, and patterns of adoption provided a conceptual framework for this study of faculty perceptions toward the adoption of virtual world technology in the classroom. Rogers (2003) created the most widely used adoption and diffusion of innovations process. Rogers also developed adopter categories, which assists in understanding the degree to which faculty are willing and able to adopt and diffuse new technology, such as virtual worlds, into the classroom.

Today's college students have been exposed to video games as long as they can remember. As *Medical News Today* states, "The first generation of kids who grew up playing video games aren't kids anymore" (http://www.medicalnewstoday.com/articles/113169.php). To help keep college students who are part of the video-gaming generation actively engaged in subjects which historically might be taught in a traditional

face-to-face classroom, (such as art history, chemistry, or literature) can be a challenge for the faculty teaching them (Grenier-Winther, 1999).

Computer-based role-playing games have been in use for over 20 years in learning environments (Riegle & Matejka, 2005). Riegle and Matejka (2005) assert that participants in virtual worlds, MUVEs or MMORPGs (Massively Multiplayer Online Role Playing Games),

> [Participants] develop ownership in their paths and goals and therefore in their own learning. Moreover, this ownership results in a learning environment that requires players to construct their own meaning within the MMORPG world. Thus, the basic design of MMORPGs provides instructional designers with an environment that facilitates deeper learning than the traditional instructional environment. (Riegle & Matejka, 2005, p. 6)

Virtual learning environments offer opportunities for faculty to engage students in learning in an immersive way, simulating reality: "Delivering course material via a virtual environment is beneficial to today's students because it offers the interactivity, real-time interaction and social presence that students of all ages have come to accept in our gaming rich community" (Hodge, Tabrizi, Farwell, & Wuensch, 2007, p. 105). MUVEs, such as *Second Life*, allow users to create their own character (avatar) and explore different simulated environments. Additionally, educators who have used *Second Life* in the classroom feel the students are more interactive and expressive in *Second Life* than they are compared to traditional online platforms (Appel, 2006). Therefore, it appears that the literature supports using interactive technology (such as virtual world technology) in the classroom as a teaching method in order to engage students in learning in an immersive way.

Steinkuehler and Duncan's (2008) research show that 86% of the discussions from a specific forum (the priest forum) from 1,984 posts on threads of participants playing *World of Warcraft* (a MMORPG) demonstrated problem solving techniques. Steinkuehler and Duncan's findings possibly show that participants posting discussions in the studied forum demonstrated "social knowledge construction," exhibiting collaborative problem solving techniques, which can relate to science reasoning (p. 534). In addition, the findings of the research in this study showed that the data from the forum postings were appropriate to the field of science (Steinkuehler & Duncan, 2008). Virtual world technology is studied as a method of encouraging knowledge construction in this article. The implication of this study relates to how today's students immerse themselves into virtual world technology, which can translate to the classroom environment as an effective instructional tool. Incorporating the use of virtual world technology as a teaching method in the classroom can perhaps further enhance the chances of engaging our digital natives, demonstrating a potential affordance to faculty.

However, incorporating a MUVE into a course takes quite a bit of work from the instructor who is teaching the course. Incorporating virtual world technology into a traditional face-to-face class takes many hours of research on the faculty's part; time that many feel they do not have (Grenier-Winther, 1999). Heavy teaching loads prevent some faculty members from having the time to devote to additional research (Baker & Zay-Ferrell, 1984). Moreover, many faculty feel that their responsibilities and roles keep growing, taxing what little free time they have even more. Grenier-Winther (1999) agrees that today's faculty are expected to balance teaching loads with class preparation time and professional duties as a faculty member: "The current reality of our positions in

academia is that we are asked to be instructors, researchers, and good departmental, university, and professional citizens, all of which takes time and energy" (p. 261). Grenier-Winther adds that creating assignments and activities for a virtual class takes an enormous amount of time, admitting that after teaching a course once through, the time commitment lessens. The time it takes to create a virtual class or create a virtual world assignment to incorporate into a traditional face-to-face class is even more daunting for faculty who are not familiar with the technology involved. Convincing digital immigrant faculty to incorporate virtual worlds into their traditionally face-to-face courses might certainly pose a problem and a potential barrier to adoption on some campuses.

Historically, there appears to have always been a tension between educators and new technologies (Jones, n.d.). Some teachers have had the fear in the back of their mind that technology might replace the teacher in the classroom. With informal learning taking place in the form of distance learning classes, it is no wonder that some teachers fear the "brick and mortar" colleges might disappear. What teachers need to realize is that technology is here to support the teacher in his or her teaching. Technology will not make the teacher a better teacher nor will it make the course the teacher is teaching more pedagogically sound (Grenier-Winther, 1999; Jacobsen, 1998).

In studying the development of virtual world technology it appears that virtual worlds could be considered a culture, which could potentially lead to an ethnographic study (Wang & Gloviczki, 2008). In virtual worlds, participants can create their own character (avatar) as well as construct their own virtual environment or culture (within a virtual environment). The virtual world participants view the virtual environment as three-dimensional spaces that "become places, which, to a large degree, are culturally

imagined and the practice of participants, their actions, conversations, movements, and exchanges, can define the world and continually infuse it with new meanings" (Thomas & Brown, 2009, p. 3). Therefore, I argue that to understand why or why not virtual world technology would be adopted by faculty as a method of teaching in the classroom, the culture of the faculty using the technology in the classroom should be considered. In order to understand a culture, one should study the perceptions and beliefs of that culture (Darnton, 1984).

Today's students thrive on instant interaction, instant satisfaction, and instant reward (Hodge, et al., 2007). "Today's students are innovative, investigative, thrive on multi-tasking and multi-processing information, and are highly exploratory and independent" (Leung, 2002, as cited in Pursel & Bailey, 2007, p. 5). These "digital natives" prefer graphic interfaces to the written word. These students grew up immersed in a technology world, where everything can be accessed instantly (Hodge, et al., 2007). However, Moser (2007) states: "Many faculty lack the necessary technical and pedagogical competencies to successfully integrate educational technology into their teaching" (p. 69). In order to address the needs of the digital natives (or digital minds), higher education faculty perhaps need to change the way they think in order to engage students in the learning (Jones, Harmon, & O'Grady-Jones, 2005).

Significance of the Study

This research study explored design college faculty perceptions of using virtual world technology in their courses. Much research has been performed on faculty attitudes towards integrating technology in the classroom (Ertmer, 2005; Groves & Zemel, 2000; Nicolle, 2005; & Straub, 2009). Yet, there appears to be a gap in the literature on

primary research performed on faculty perception of using virtual world technology in their courses. By exploring design college faculty perceptions about incorporating virtual world technology as a teaching method, perhaps an insight to why some faculty choose to adopt certain technologies and other faculty do not will be understood.

As mentioned previously, "To perceive is, cognitively, just to think, to entertain propositions" (Smith, 2001, p. 287). Beliefs can influence perceptions, but beliefs tend to be more firmly held, since they are perhaps based from experience and knowledge (Pajares, 1992). When addressing the use of virtual world technology in the classroom, some faculty may not have enough knowledge about the technology to have formed a belief about using the technology, but perhaps might have a perception instead. The design college faculty included in this research study teach students who are receiving a degree in one of several industry-standard, technology-driven, interactive-based applied arts majors. Based on the design college faculty included in this research, I would argue that the use of the word perception might be a more appropriate term than belief in this case, since the faculty must constantly "entertain propositions" (Smith, 2001, p. 287), in order to maintain what is considered the industry-standard for the majors they are teaching. On the other hand, as stated previously, beliefs can influence perceptions (Pajares, 1992). Therefore, to understand faculty perceptions, both faculty perceptions and beliefs were explored in this study.

Although studying higher education faculty perceptions of using virtual world technology in the classroom would provide insight for studies for research on faculty perceptions, this study focused only on design college faculty perceptions. The participants for this study were recruited from 21 individual design colleges located in

different cities throughout North America. The design colleges in this study are private, proprietary schools, which are part of a group of design colleges, owned by the same corporation. The design colleges in this study grant bachelor's degrees, associate's degrees, and diplomas in applied arts subjects. The 21 colleges targeted in this study only offer majors that are in the applied arts field (such as graphic design, interior design, Web design, interactive media design, animation, advertising, photography, digital filmmaking, audio production, fashion design, illustration, video game programming, and motion graphics). These colleges do not have majors in the general education field (such as science, math, English, foreign languages, humanities, social sciences, or history). However, since these design colleges grant bachelor's degrees, the curriculum must contain approximately 25% (or more, depending on the accreditation) general education classes.

The objectives of this research study were: 1) to use quantitative survey data to assist in identifying faculty perceptions of using virtual world technology in the classroom as a teaching method; 2) to use interview data to support the quantitative data collected in the survey and obtain thick descriptions on perceptions and beliefs from the faculty interviewed; 3) to identify faculty perceptions on adopting virtual world technology in the classroom; 4) to identify faculty perceptions of the affordances of using virtual world technology in the classroom; and 5) to identify faculty perceptions of the challenges of using virtual world technology in the classroom.

Design Limitations

Since the design colleges targeted in this study are located in different regions of the country, the location of the individual design college being surveyed may (or may not) have impacted the results of the study. Moreover, a design limitation could possibly include that since the colleges used in this study were design colleges that perhaps tend to incorporate and use many different instructional technology methods in the classroom (such as interactive media), the results of the research may not be generalizable to colleges that do not tend to incorporate many different methods of instructional technology (including interactive media).

Likewise, faculty who volunteered to participate in the study might differ from those who represent the target population as a whole. For instance, faculty from one design college who chose to participate in the study may differ from the faculty in another design college (even though all of the colleges in the study are design colleges and are all part of the same system of schools). The difference can occur either because of where the region the colleges are located or by the subjects being taught by the faculty in the design colleges.

In the following chapter, the literature review explores areas that provide a framework for understanding issues related to faculty perceptions and beliefs about using virtual world technology as a teaching method. The literature review is divided into four areas: faculty perceptions about adopting virtual world technology; faculty perceptions and epistemological beliefs, which possibly affect the adoption of a new teaching method; faculty perceptions of the affordances of using virtual world technology in the classroom; and faculty perceptions of the challenges of using virtual world technology in

the classroom. Following the literature review, the methodology chapter outlines the design of the study by discussing the context of the study, the participants, the role of the researcher, the data sources, data collection, and data analysis procedures. The results chapter follows the methodology chapter detailing the findings of the research. The final chapter is the discussion and conclusions chapter, which discusses the research results in relationship to the research questions posed and the literature review. Implications and limitations of the results of the study as well as suggestions for future research are also included in the final chapter.

A pilot study for this research was conducted at a design college in the southeastern United States in order to explore faculty perceptions on using virtual world technology in the classroom. The pilot study was used as an ancillary aspect of this research to provide first-hand insight to faculty reactions to the introduction of virtual world technology. Through observations, journaling, and interviews, the documented reactions of the participating pilot study faculty assisted in constructing and revising the survey and post-survey interview questions (after adapting the Nicolle (2005) survey) to address the research question.

Definition of Terms

Descriptive definitions of significant terminology related to this proposal include:

Affordance: Based on the Affordance Theory by James Gibson (Gibson, 1977) and adopted as "perceived affordance" by Donald Norman (Norman, 1988). An action performed based on the intended function of an object or innovation. For example, when one sees a doorknob, one perceives that the doorknob will open the door (Norman, 1988).

In this study, an affordance is used as a term to define an innovation that allows the user to perform a particular task for a particular situation.

Applied arts: The application of design in a practical and/or commercial aspect (versus fine art). Examples of applied arts include design fields, such as: advertising, animation, audio production, commercial photography, fashion design, game design, graphic design, industrial design, interior design, motion graphics, Web design, and video production.

Avatar: A computer-animated graphic character or identity that represents a user, manipulated by the user on a computer.

Beliefs: Based on values held by an individual; a tenet; a conviction of a phenomenon. "Beliefs are basically unchanging," are not "open to evaluation and critical examination," and are strong "predictors of behaviors" (Pajares, 1992, p. 311).

Change agent: An individual who is respected within his or her community and is seen as one who adopts new ideas, practices, or objects (Rogers, 2003).

Critical mass: When a new idea, practice, or object becomes adopted within a community and becomes self-sustaining (Rogers, 2003).

Epistemological beliefs: Beliefs, perhaps stemming from an innate sense (or intrinsic sense) from within a person, versus beliefs gained from learned experiences.

Ideal type: Defined by Max Weber as what one perceives as a construct or model for a particular role in a social system or society. The 'ideal type' refers to characteristics that relate to a particular role in society; one that is constantly being reconstructed depending on who is interpreting the specified role.

Innovation: An idea, practice, or object that is perceived as being new by an individual or social system (Rogers, 2003).

Massively Multiplayer Online Role Playing Games (MMORPGs): Software-based games that support potentially thousands of players simultaneously through the Internet. The players use a computer-animated fictional character (avatar) as their role in the game to play with and against other characters (avatars) in the game.

Meta-analysis: A type of research that synthesizes or analyzes existing empirical studies. Conclusions are gathered from several studies and suggestions made for future research (O'Sullivan, Rassel, & Berner, 2003).

Mixed methods research: Involves combining qualitative data and quantitative data into a merged dataset in order to determine research findings. In a mixed methods dataset, one type of data support the other type of data to maximize the strengths and minimize the weaknesses of both types of data.

Multi-User Virtual Environments (MUVEs): Software-based applications that simulate an environment using real-time interaction between participants within the computer environment through a 3-D graphic representation of the real world.

Pedagogical beliefs: Refers to teaching practices combined with philosophical beliefs, which perhaps influence how teachers teach (Ertmer, 2005).

Perception: To observe or become aware of your surroundings; to "form beliefs about objects and events" (Musto & Konolige, 1993, p. 90); to form a concept about an object, event, or process (Armstrong, 1993); "requires a particular belief" about an object (Moser, 1986, p. 121).

Self-efficacy: A belief about ability to perform a certain task or obtain a certain goal or outcome (Straub, 2009).

Technology-driven, interactive-type programs: Referenced in this study as academic programs that rely heavily on technology, including interactive technology such as: animation, audio production, game design, graphic design, industrial design, motion graphics, Web design, and video production.

Virtual learning environments (VREs): Commonly referred to as an online learning environment where teaching and learning is conducted.

Social system: A set of interconnected elements (such as a community of individuals) committed in joint problem solving efforts to accomplish a common goal (Rogers, 2003).

Virtual reality (VR): An artificial, computer-generated simulation that creates the illusion of reality.

Virtual World Technology (VWT): Includes software-based applications that simulate an environment. The virtual world environment is considered a 3-D graphical representation of the real world.

CHAPTER 2

LITERATURE REVIEW

In researching articles for this research proposal, it appeared that research studies pertaining directly to the topic of this paper were limited in relationship to research studies involving faculty perceptions of adopting virtual worlds in the classroom, whereas there was more research on students and their embracing of virtual worlds, such as Multi-User Virtual Environments (MUVEs) and Massively Multiplayer Online Role Paying Games (MMORPGs) (Adams, 2007; Duncan, 2005; Grenier-Winther, 1999; Inoue, 2007; Kluge & Riley, 2008; Reigle & Matejka, 2005; Steinkuehler & Duncan, 2008; & Wang & Gloviczki, 2008). There are research studies supporting higher education faculty perception of adopting technology in general (Albright, 1996; Jacobsen, 1997; Jacobsen, 1998; Johnson, Schwab & Foa, 1999; Straub, 2009; & Sugar, Crawley & Fine, 2004), but a very limited number of research studies pertaining to higher education faculty perception of adopting virtual world technology in the classroom. Nevertheless, when reviewing the literature for this research study, it is reasonable to state that the same affordances and barriers higher education or design college faculty face in adopting technology in general can perhaps be applied to virtual world technology.

The literature review for this research study explores areas that provided a framework for understanding the issues related to the research study construct (faculty

perceptions about using virtual world technology as a teaching method). The literature review is divided into sections that directly relate to the research questions.

The first part of the literature review discusses faculty perceptions about technology that potentially affects the adoption of virtual world technology into the classroom. The second part of the literature review discusses research on faculty perceptions and epistemological beliefs, which could possibly affect the adoption of a new teaching method in the classroom. The third part of the literature review examines faculty perceptions of the affordances of using virtual world technology in the higher education classroom. The final part of the literature review attempts to provide a framework for examining faculty perceptions of the challenges of using virtual world technology in the classroom.

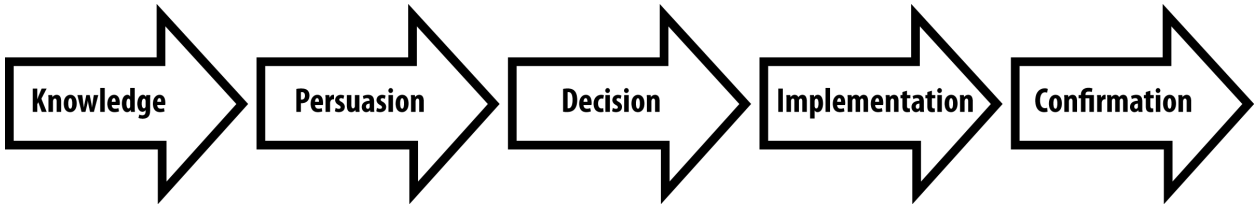
Faculty Perceptions About Adopting Virtual World Technology into the Classroom

In order to understand the adoption and diffusion process of an innovation as it relates to faculty adopting and implementing the use of virtual worlds in the classroom, a discussion of adoption theories is forthcoming in this section of the literature review. It is reasonable to assert that by examining adoption theories, perhaps insights to why faculty either adopt a new technology (such as virtual world technology) or not, might be revealed (Jacobsen, 1998; Johnson, Schwab, & Foa, 1999; Sugar, Crawley & Fine, 2004). For the purpose of this research study, an innovation (any newly perceived idea, practice, or object: Rogers, 2003) relates to instructional technology (in this case virtual world technology) integrated into teaching and learning. This section of the literature review discusses the innovation diffusion theory, adoption theories, adoption patterns of faculty, and faculty beliefs related to the adoption of technology in general.

Diffusion of Innovations

Rogers (2003) created the most widely used adoption and diffusion theory. Rogers describes the innovation-decision process in five sequential steps (see Figure 1) as a process through which an individual initially has knowledge of an innovation (knowledge), formulates an opinion towards the innovation (persuasion), makes a decision whether to adopt the innovation (decision), decides to implement the innovation (implementation), and confirms the decision whether the innovation is adopted or not (confirmation). This is a process that occurs over time.

Figure 1. The five sequential steps in Rogers' innovation-decision process (Rogers, 2003).

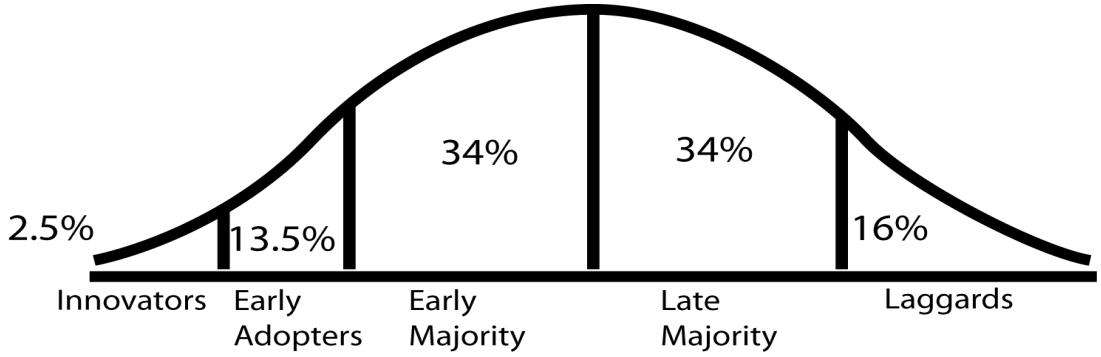


Rogers discusses the innovation-decision process, the rate of adoption of innovations, the adopter categories, opinion leaders, change agents and how they affect the adoption and diffusion process, and the consequences of innovations. By understanding the category of adopters of faculty in higher education: innovators, early adopters, early majority, late majority, or laggards (Rogers, 2003), and their rate of adoption of innovations (see Figure 2), one might be able to understand the degree to which faculty are willing and able to adopt and diffuse new technology, such as virtual worlds into the classroom.

Rogers describes the *innovators* as the ones who initiate new ideas in the social system. He describes the *early adopters* as the ones who embrace a new idea, implement it, and communicate the results to others in the social system (Rogers, 2003). The *early*

majority adopters espouse new ideas before most of the social system members. The *early majority adopters* may deliberate for quite awhile prior to adopting an innovation (Rogers, 2003). Rogers depicts the *late majority adopters* as dubious of new ideas and hesitant to adopt. Finally, the *laggards* are the very last ones to adopt new ideas in the social system. The *laggards* are resistant to change (Rogers, 2003).

Figure 2. Rogers' (2003) Adopter categories and the percentage of innovativeness.



Diffusion is a change to the structure or function of a social system (Rogers, 2003). A social system can be defined as a community of independent people "which work in more or less complementary way toward more or less compatible goals" (Pervin, 1967, p. 317). Colleges can be seen as a social system "in the sense that the parts and goals involve people, with individual and group needs to be satisfied" (Pervin, 1967, p. 317). Rogers describes the diffusion process as four steps: introduction of the innovation, information processed through communication channels, time needed to adopt and diffuse the innovation, and the social system that decides to diffuse the innovation.

An innovation is an idea, a practice, or an object that is either new or perceived as new by individuals in a social system (Rogers, 2003). The rate of an adoption (according to Rogers, 2003) is determined by the relative advantage, the compatibility, the complexity, observability, and trialability. The more complex the innovation, the less

chance it has to be adopted by the social system. However, the more compatible the innovation is with existing innovations within a social system, the more likely that it will be adopted (Rogers, 2003).

The opinion leader is a well-respected individual within a social system (Rogers, 2003). People listen to the opinion leaders in their social system. Change agents are individuals who are also respected within their social system and are seen as innovators (Rogers, 2003). Change agents are responsible for convincing the social system to adopt an innovation in the appropriate direction deemed by the Change Agency (Rogers, 2003). Change agents seek out the opinion leaders in a social system in order to convince the opinion leader that an innovation should be adopted by the social system (Rogers, 2003). If change agents provide demonstrations on how the innovation works, the innovation has a greater chance of getting adopted (Rogers, 2003). Change agent demonstrations are especially important for the successful adoption and diffusion of interactive innovations (such as virtual world technology) (Rogers, 2003). The goal of the diffusion of an innovation is to reach critical mass. Critical mass is where the diffusion becomes self-sustaining, which is especially important for an interactive innovation (Rogers, 2003).

Rogers (2003) describes the innovation-decision process as a:

> Process through which an individual (or other decision making unit) passes from gaining initial knowledge of an innovation, to forming an attitude toward the innovation, to making a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. (p. 168)

Rogers' diffusion process follows a S-curve, where the diffusion of an innovation begins slowly, rises quickly to a peak, and then drops off as the innovation is diffused into the social system and/or another new innovation is introduced.

Rogers' theories relate to the adoption and diffusion of virtual worlds technology into the traditional classroom, since virtual world technology can be considered an interactive innovation. By understanding the category of adopters of faculty in higher education (innovators, early adopters, early majority, late majority, or laggards) (Rogers, 2003, p. 298), and their rate of adoption of innovations, one might be able to understand the degree to which faculty are willing and able to adopt and diffuse new technology, such as virtual worlds into the classroom.

Jacobsen (1997) examines the gap between faculty who are early adopters of technology and the later adopters who are concerned primarily with teaching and learning. Jacobsen supports Roger's (2003) adoption and diffusion theory as it applies to college faculty by identifying the technology gaps that some faculty experience. The purpose of Jacobsen's research study was to examine early and late adopters of technology in higher education amongst faculty. Jacobsen (1997) feels that faculty development opportunities perhaps would assist in faculty adoption of new technologies: "The main reasons that mainstream faculty hesitate to adopt [new technologies] are the lack of effective training and support" (p. 24).

Several research studies are cited within Jacobsen's (1997) article to support the need for adopting technology in the classroom, indicating a meta-analysis research approach. Jacobsen suggests future research to include: "case study research of individuals who are both early adopters of instructional technology and excellent teachers" (Jacobsen, 1997, p. 1). This article, suggests that some faculty have a difficult time adopting and diffusing new technology (depending on which type of adopter category they belong). In addition, the article posits that faculty adoption of technology

perhaps also depends on the training support the administration is willing to provide to support new technologies (Jacobsen, 1997).

Adoption Theories

Adams (2002) discusses a study that was conducted during the middle of a "five year computer integration innovation cycle" (p. 285). She states: "This study is based on the premise that faculty are key to successful integration of technology into the educational process" (Adams, 2002, p. 285). Adams points out that teachers have preconceptions about innovations (affected by their perceptions and beliefs) and how the innovations should be integrated into the classroom. Adams outlines adoption models such as Roger's diffusion of innovations theory and Hall's Concerns-Based Adoption Model (CBAM). In this article, change is viewed as a process. Much like Roger's theory, Adams points out that Fuller (1969) initially observed a gap between what teachers needed in the classroom and what they received as far as faculty development and training (agreeing with Jacobsen, 1997). Moreover, the Concern-Based Adoption Model (CBAM) focuses on teacher concerns: "concern with self; concern with task; and concern with impact" (Adams, 2002, p. 286).

Adams (2002) addresses the measurement of adoption and diffusion of innovations through time (how long it takes an innovation to be diffused into a social system) for the Roger's model and measurement tools used in the CBAM. A questionnaire was used in the study (the Computing Concerns Questionnaire - CCQ), identifying seven different levels of teacher concerns (Adams, 2002). Participants were surveyed with a 32 question, seven point Likert scale. The study also included a demographic survey that covered use of technology, age, gender, and other demographic

indicators. In addition, a correlation analysis was used to determine relationships between the variables (Adams, 2002). The sample in the study was a "convenience group sample including the 589 full and part-time faculty members teaching at a postsecondary teaching institution" (Adams, 2002, p. 291). The percentage of questionnaires returned was 49% for full-time and 29% for part-time, with 231 out of 589 questionnaires returned (Adams, 2002). The results of the research study showed a significant correlation coefficient between gender and technology engagement (Adams, 2002). The summary results of this research indicate:

- The 18-24 age range display recognizably higher level of computer integration
- Females display a greater integration average than do males.
- The overall trend shows those in their middle years of teaching tenure, 10 to 19 years experience, as having the least demonstration of integration of technology into teaching practices.
- Respondents with less than 10 years of experience or those with 20 years or more of teaching experience demonstrate a greater degree of technology integration.
- The data indicate that approximately 25% of the respondent faculty population is not actively participating in the innovation. (Adams, 2002, pp. 298-299)

Adams (2002) discusses the results of the research study implying that faculty development is essential in order for the faculty to learn about new technologies or innovations to diffuse into their teaching. The results of the research study: "indicate that younger female teachers with less teaching experience more readily integrate technology into teaching practices" (Adams, 2002, p. 298). In addition, Adams mirrors Jones, et al., (2005) and Prensky (2001) beliefs about 'digital natives' or 'digital minds': "Younger adults were raised with technology, with computer games commonly available since the

mid-1970's" (p. 298). Another factor that Adams reveals is that approximately one quarter of the participants who responded to the questionnaire used in this study revealed that they were nonusers of technology innovations, which exceeded the predicted nonusers in Rogers' model, noting the limitations of the time constraints in Adams' study as possibly contributing to the difference (Adams, 2002). Adams performs primary research in this study via a quantitative survey. Although her research study is on faculty adoption of technology in general (versus targeting virtual world technology), the Adams article explores avenues that encourage faculty adoption of new technologies (such as virtual world technology), which could potentially include faculty development opportunities.

Anderson (1997) also examines the Concerns Based Adoption Model (CBAM) and provides an in-depth description of how the CBAM works (Stages or Concern, Levels of Use, and Innovation Configurations) to emphasize the three analytical frameworks for measuring change in behavior. Anderson cites several research studies that have been performed (Bailey & Palsha, 1992; Evans & Hopkins, 1990; Kember & Mezger, 1990; Marsh, 1987; Marsh & Penn, 1988; and van den Berg & Vandenberghe, 1986) to illustrate how the CBAM has been tested over many years, demonstrating that the CBAM theory "might be applicable to describing and explaining the way teachers experience major organizational changes as opposed to change in the curriculum and teaching practices, represents a new focus for CBAM theory and research" (van den Berg, 1993, in Anderson, 1997, p. 344).

After an in-depth look at how the CBAM has been implemented through the years in various studies, Anderson (1997) performed his own research, specifically using,

"Consequence and Collaboration concerns when implementing an instructional change in schools characterized by norms of professional collegiality than in schools with more individualistic work patterns" (p. 353). His study researched eight elementary schools, gathering data on preexisting collaboration between teachers, change management opportunities, the plans for changes, and teacher implementation of the changes (Anderson, 1997). The data were gathered using surveys and interviews. The Stages of Concerns measurement in Anderson's (1997) study showed a peak of Stage 5 (Collaboration concerns), indicating that "the teachers' Collaboration concerns were likely more a reflection of the change process strategy than of feelings about working with others to make innovations work better for students" (p. 353). Furthermore, Anderson (1997) points out the complexity of the relationship between teachers concerns about collaboration stemming from a change process intervention (such as integrating a new technology) that center around "teacher-to-teacher interaction" (p. 354), as well as teacher concerns about the impact of the collaboration on student outcomes.

Anderson (1997) concludes that the CBAM continues to be relevant in understanding the concerns teachers have when having to change their teaching practices. However, Anderson asserts that the CBAM "does not fully explain teacher change in response to innovations in curriculum and instruction," but needs further refinement over time (Anderson, 1997, p. 363). Thus, based on Anderson's study, it appears that even though the CBAM is seen as a model that is used to address the concerns and beliefs of teachers in regards to innovations in teaching and learning (Straub, 2009), perhaps the use of the CBAM in conjunction with another adoption model would work better than the CBAM alone. On the other hand, Anderson might have provided insight and suggestions

for future research, since he believes that further refinement of the CBAM is in order. Anderson's research involves using an adoption theory, which can perhaps assist in predicting concerns that faculty have in regards to adopting new technology in their teaching.

Demonstrating collaboration on adoption theories and processes, Straub (2009) compares four adoption theories. The four adoption theories that Straub discusses are Roger's innovation diffusion theory, the Concerns Based Adoption Theory (CBAM), the Technology Acceptance Model (TAM) and the United Theory of Acceptance and Use of Technology (UTAUT). Straub stresses that it is not just the decision of an administration of a school to adopt an innovation, but the individuals who make up the school (the social system) that make a difference in whether the innovation is diffused within the school successfully.

Straub (2009) asserts that Bandura's social learning theory can be viewed as a "lens for adoption and diffusion theories" (p. 628), learning not only from their own experiences but also from learning from those around them. In the article, Straub applies Bandura's social learning theory to those who are potentially adopting an innovation:

> In terms of adoption and diffusion, social learning has two potential roles. First, through modeling, individuals observing others adopting a particular innovation may be more inclined to consider adoption themselves. The vicarious experience of someone successfully or unsuccessfully using a technology may influence others. Secondly, in previous years, modeling was primarily conceptualized as a concrete phenomenon, but the technical development in recent years and the accessibility of mass media, modeling and vicarious learning suggests that vicarious learning also occurs in the symbolic range (Bandura, 2001, in Straub, 2009, p. 629).

Terms are defined in this article to give the reader a contextual aspect of how the terms are applied. Straub (2009) points out that although Rogers' theory of innovation diffusion process is the most universally used theory, it does not always fit the adoption process in question. The author states that all theories discussed in this article are pro-adoption theories and "when adoption does not occur, it is considered a failure of the diffusion-adoption process, or non-diffusion rather than its own stage of a process" (Rogers, 1995, cited in Straub, 2009, p. 628).

Rogers' diffusion process is discussed at length in Straub's (2009) article, emphasizing that Rogers' model is the most widely used model (mainly due to the adopter categories defined in Rogers' model). Straub also discusses Hall's CBAM, since the author feels that Rogers' theory does not fit all situations, suggesting that for an academic environment, Hall's CBAM might be a better fit. The difference in the CBAM theory and the Rogers' theory deals with the CBAM being concerns based (Stages of Concern), tending to focus on beliefs on how the innovation affects the potential adoptee as an individual and the impact the innovation has on his or her work environment (Straub, 2009). However, Straub does point out the weakness of CBAM in that there can be inconsistencies in results with two of the stages which affects the reliability and validity of the theory. Limitations also include that the "teacher is not only an adopter of the innovation but also must act as the change agent for his or her students" (Straub, 2009, p. 636), which aligns with Johnson, Schwab, and Foa's (1999) research. CBAM also tends to be client-centered but depends on the change agent to facilitate the adoption and diffusion process (Straub, 2009).

The last models that Straub (2009) addresses are the TAM and UTAUT models. These models are separate models but appear to be treated as one model in Straub's article, primarily because the UTAUT model is a newer version of the TAM. These models deal with a specific type of innovation – computer-based technologies. Straub notes that the advantage of the TAM and UTAUT is the perceived ease of use and perceived self-efficacy (which are not the same in this case). A weakness that the TAM demonstrates is the inability to recognize individual differences in experiences prior to the introduction of the innovation that might influence the adoption of an innovation (Straub, 2009). The UTAUT also deals with technology-based innovations but also predicts behavioral intentions (Straub, 2009). The UTAUT is a relatively new model, developed in 2003.

Implication for further research is suggested in Straub's (2009) article, since no primary research was performed in this particular study. The article is a meta-analysis on adoption and diffusion theories. Usefulness of an innovation appears to be more important than ease of use. Moreover, the school administration supporting the adoption and diffusion of an innovation is also seen as having an important impact on the faculty perception of whether the faculty will be able to diffuse the innovation in the classroom (Straub, 2009).

Johnson, Schwab and Foa (1999) address faculty adoption of technology in the classroom. The authors address how schools are expecting teachers to incorporate more and more technology into the classroom and the issues surrounding the training of all of the teachers to use the new technology. The article cites research studying the infusion of new technology involving 200 schools over a period of four years, observing teachers

creating a paradigm shift as they learn and adopt the new technology (Johnson, et al., 1999). The article provides a case study of a specific teacher, Ms. Rogerio (whose name is a pseudonym in the article) who was an early adopter of technology. Johnson, et al. are very descriptive in regards to detailing Ms. Rogerio's experience.

Ms. Rogerio taught herself the technology she used in her classroom. She took students on virtual field trips, such as to the Globe Theatre, and assigned the students projects and questions based on the virtual field trips (Johnson, et al., 1999). Ms. Rogerio had issues with slow Internet connection and student access to computers at times, but was especially troubled by the fact that she was having to teach computer skills to the students, taking away from the content of the English course (Johnson, et al., 1999). While other teachers noticed that Ms. Rogerio was using technology in the classroom, Ms. Rogerio never discussed what she was doing in department meetings, therefore was in isolation incorporating technology in her classroom, perhaps unable (or unwilling) to share any issues she was having with her peers. If she had, she might have been able to collaborate with the other teachers to work out the issues she was having. The authors point out, that even after all of the technology Ms. Rogerio was incorporating in her class, "her teaching practice and methods only changed superficially" (Johnson, et al., 1999, p. 26), since she still used the textbook as the primary teaching tool for subject content.

The authors contend that teachers need to move past the early adopter phase and become change agents in the school. Perhaps had Ms. Rogerio moved past the early adopter phase and became a change agent for incorporating technology in the classroom, she could have possibly influenced other teachers (and the administration) to use new technologies in their classroom (Rogers, 2003). As stated previously, Ms. Rogerio

operated in isolation, not sharing her innovation with her peers or the administration (Johnson, et al., 1999). In order to effectively adopt an innovation, Ms. Rogerio should have shared her experiences with her peers and the administration so that together they could have worked out any problems (such as using time away from teaching the subject matter). In addition, Ms. Rogerio could have acted as a change agent, encouraging other teachers (and the administration) to adopt the new technology into the classroom (Johnson, et al., 1999; Straub, 2009). Even though Johnson, et al. do not specifically address virtual world technology, the authors mention "virtual field trips," which could be interpreted as using virtual world environments as the vehicle for the "virtual field trips."

The Johnson, et al. (1999) article demonstrates that some faculty are willing to adopt and diffuse new technology in their own classroom, but that a few of these faculty are still working in isolation when it comes to designing their classes. This attitude perhaps reflects on faculty members' perceptions and beliefs about spending time developing materials for their classes. Faculty perhaps feel that this material is their own material, thus not willing to share with other faculty (even though the time developing the materials might have been created while the faculty member was on the school's time clock). Maybe there should be some type of reward system implemented in order to encourage faculty to share resources and materials (such as Grenier-Winther, 1999, Jacobsen, 1998, and Rodriguez & Knuth, 2000 suggest). Johnson, et al. discuss technology as being the change agent in the classroom in this article, however, perhaps the more relevant issue in this case study may actually be the teacher becoming the change agent in order to influence other teachers' adoption of new technology.

In studying the different adoption models and understanding the application of adoption models, one can possibly ascertain why some faculty adopt new technologies and other faculty don't. Rogers' (2003) adoption diffusion process provides insight to adopter categories by classifying the tendencies of innovativeness of faculty, which can conceivably assist in understanding faculty perception on the use of virtual world technology in the classroom. Straub (2009) asserts: "Roger's theory of innovation diffusion provides a foundational understanding of adoption theories. Roger's theory has been used broadly across disciplines to comprehend and predict change" (p. 627). Innovativeness categories (whether a faculty member is categorized as an innovator, an early adopter, early majority, late majority, or a laggard) can perhaps assist in an understanding of faculty perceptions about adopting new technologies (Rogers, 2003; Straub, 2009).

Adoption Patterns of Faculty

Jacobsen (1998) asks: "Why is the integration of technology for teaching and learning so appealing to some faculty, and not to others" (p. 2)? Jacobsen conducted a study on 76 faculty members at two universities, using a web-based survey instrument to determine "technology use patterns, computer experience, use of technology for teaching, general self-efficacy, changes to teaching and learning, incentives and barriers" (p. 1). Moreover, Jacobsen explored the potential disparity between early adopters of an innovation and the mainstream faculty. Rogers' adoption categories and innovation-decision process is used as a framework for Jacobsen's study. Jacobsen used the *Annual Campus Computing Survey* to gauge the adoption of technology use by university faculty as a reference for her survey. In her survey, Jacobsen included questions to garner

responses on changes to teaching and learning, incentives to integrate technology, and barriers to integrating technology. Jacobsen found that faculty anticipate spending extra time developing course materials when integrating new technology into their courses; the top incentive for integrating technology was personal gratification; all faculty experienced barriers when faced with integrating new technology (most notably the lack of time the faculty felt they had to learn and use new technology); and finally, "the perception that technology is still an unproved instructional intervention" (p. 6).

Jacobsen's (1998) study provides insight to faculty opinions on adopting and integrating technology in the classroom (although not specifically virtual world technology). She emphasizes that blame should not be placed on faculty attitudes about adoption but that universities should design technology integration plans to facilitate the adoption of new technologies into the classroom. Jacobsen suggests a reward system as an incentive for faculty to learn the new technologies in order to have confidence in using the innovations in the classroom (agreeing with Grenier-Winther, 1999, & Rodriguez & Knuth, 2000). Furthermore, Jacobsen concludes that early adopters and excellent teachers are not necessarily one in the same (concurring with Driscoll, 2002). She emphasizes that excellent teaching should be the first priority for universities and if both excellent teaching and early adoption are found in an individual, " then it is worth profiling this expertise for the benefit of other faculty members who wish to develop both their technology and teaching knowledge and skills" (Jacobsen, 1998, p.7).

Jacobsen's (1998) article references Rogers' adoption model, she examines other relevant research, and she performed primary research on teacher beliefs about adoption of technology. However, the sample size was only 76 faculty members from two different

universities in the same region. Therefore, it might be questioned that her study is generalizable to other university faculty due to the sample size. In addition, Jacobsen does not admit to any limitations of this study or whether the survey she generated was tested for reliability, which would possibly lead to questioning the trustworthiness of the study.

Nicolle's (2005) study explores the "how, when, why, and why not" of whether faculty integrate technology into their courses (p. ix). Nicolle surveyed higher education faculty from three colleges within a large university in the southern part of the United States, with approximately 1,300 full-time and part-time faculty in her mixed methods study. Nicolle developed a survey instrument from 10 previously tested survey instruments, including the "Faculty Attitudes Toward Information" instrument and Jacobsen's (1998) dissertation survey instrument measuring technology innovativeness by university faculty. Seven hundred thirty-three faculty were recruited to participate in the survey. One hundred and twenty-nine faculty responded to her survey, with a response rate of 16.9% (Nicolle, 2005). She provided an option for faculty participating in the survey to provide an email address to potentially be included in an interview. Nine faculty were selected for interviews.

The results of Nicolle's (2005) study implies: that faculty tended not to integrate technology when they perceived the technology was not related to their discipline; the value of effective teaching was perceived as important to the faculty studied; the ability to directly connect the technology to their teaching; and the importance of peer interactions in reference to learning about technology (Nicolle, 2005). Furthermore,

Nicolle's study revealed "a strong link between relevant use of technology, effective teaching, and the perceived benefit to student learning" (p. 125).

Sugar, Crawley, and Fine (2004) examine how teacher beliefs affect the adoption of technology using Ajzen's Theory of Planned Behavior as a guideline. Sugar, et al. used mixed methods research, combining quantitative and qualitative data collected from teachers in four schools in the southeastern United States. The results of Sugar, et al. study showed that individual teacher beliefs and attitudes affect the technology adoption decisions due to perceptions of the consequences of adopting the new technologies. An interesting aspect of this study is that the teachers' adoption decisions were not influenced by outside entities, such as the administration of the school (Sugar, et al., 2004).

Sugar, et al. (2004) examined previous research on adoption of technology by teachers prior to conducting their own primary research study. Sugar, et al. looked at quantitative studies that looked at teachers' beliefs towards adopting technologies. The research result Sugar, et al. found indicated that the "psychological effect of change" (p. 202) in conjunction with learning to use the computer technology "plays and essential role in successful technology adoption" (p. 202). The CBAM was also researched in this study as a model for adoption.

"Teachers' technology beliefs are influenced by their teaching philosophy" (Sugar, et al., 2004, p. 202). Sugar, et al.suggest that teachers perhaps need to change their way of thinking (agreeing with Jones, et al., 2005) in order to change from a teacher-centered classroom to a learner-centered classroom, to use more of a constructivist approach (in accord with Ertmer, 2005).

The goal of the Sugar, et al. (2004) study was to "identify and examine teachers' beliefs regarding their decision to adopt new technology into their classrooms using Ajzen's (1985) Theory of Planned Behavior (TPB)" (p. 203). Initially six high school teachers were used in their study, using purposeful sampling from the results of a pre-assessment survey (Sugar, et al., 2004). The skills and beliefs toward technology of these six high school teachers were examined. The six teachers taught a variety of subjects and were interviewed about their beliefs on technology adoption. The teachers were given an open-ended questionnaire "to elicit teachers' personal, normative, and control beliefs about technology adoption" (Sugar, et al., 2004, p. 204). Once the open-ended questionnaires were complete, the teachers participated in a semi-structured interview to "further explore teachers' answers and gain additional insights" (Sugar, et al., 2004, p. 204). The authors used an adaptation of Lincoln and Guba's 1985 constant comparison technique to examine the qualitative data collected (Sugar, et al., 2004). The outcomes of the open-ended questionnaire and the semi-structured interviews resulted in "salient beliefs" (p. 205), which were used to create a closed-ended questionnaire. Sixty-seven closed-ended questionnaires were returned for a 86% return rate (Sugar, et al., 2004).

The results of the Sugar, et al. (2004) study showed some positive and some negative attitudes towards adopting technology in the classroom. The positive aspects revealed in the study included the possibility of holding students' attention to the subject when technology is introduced, exposing students to different technologies, preparing students for careers, and enabling students to gain new technological skills (Sugar, et al., 2004). The negative aspects of the study included "entertaining" the students rather than engaging the students in the learning and encouraging the students to be too dependent on

the technology (Sugar, et al., 2004). Therefore, the advantages of adopting technology in the classroom appeared to outweigh the disadvantages in this study.

Sugar, et al. (2004) discuss the results of their study, emphasizing that it appears that technology adoption is a personal choice amongst teachers, "uninfluenced by other people and the presence of resources or impediments in the local school/district" (p. 211). Thus it appears that the reason teachers in this study adopt technology is due to intrinsic reasons, versus external motivators. The teachers in this study perceive the affordances technology adoption has on students and their future careers over the potential affordances that the technology presents for the teachers themselves (Sugar, et al., 2004).

The impact that Sugar, et al. (2004) study has on the research includes an insight into teacher beliefs towards the adoption of technology in the classroom (although not specifically virtual world technology). Moreover, the Sugar, et al. study not only referenced other related research studies, but also performed primary research to support the studies referenced.

Windschitl and Sahl (2002) performed an ethnographic study (over a two year period of time) on three middle school teachers who were required to integrate technology into their classrooms via a computer laptop initiative implemented by their school. In the article, Windschitl and Sahl provide a thick description about the teachers' experiences incorporating laptop technology into their classrooms. Instead of summarizing the experiences the three middle school teachers had in context to their experiences, attitudes, beliefs, and behaviors, a detailed account of each teacher's experience in integrating the computer laptop initiative is provided from the observer's (the author's who were performing the study) perspective. Even though Windschitl and

Sahl's study is a thick description about three middle school teachers' experiences (teaching at the same middle school) with technology adoption, this study can certainly relate to higher education faculty experiences, perceptions, beliefs, and behavior towards technology adoption in their classrooms.

Carol, Stephan, and Julia are the three middle school teachers involved in Windschitl and Sahl's ethnographic study. Windschitl and Sahl (2002) state:

> The selection of Carol, Stephan, and Julia proved to be fortuitous. Their choices about how to use technology in their classrooms emerged from different personal histories, unique ways in which they reconciled perceived institutional expectations for teaching with their own beliefs about students and learning, and varying access to settings in which one could learn about technology. (p. 175)

In addition, Windschitl and Sahl (2002) give a descriptive background of how the three teachers' pedagogical viewpoints affect their tendencies to adopt technology: "We explore how these individuals' personal histories as teachers and their beliefs about students and learning played out in the context of the institutional culture to influence their thinking about technology use in the classroom" (p. 175).

Windschitl and Sahl's (2002) study showed that the first teacher's (Carol) pedagogy was perhaps originally based on her beliefs, attitudes, and experiences from a cultural context, but after adapting to the technology over time her beliefs changed. According to Ertmer (2005), faculty beliefs can change about technology if there has been a positive personal experience related to the technology; a "vicarious experience" (p. 34), where the faculty has observed another faculty successfully using the technology; or by cultural influences such as the "values and opinions expressed by those around

them, and by the expectations of influential others, all of which have transmitted through formal and informal norms, rules, and procedures" (p. 34).

The second teacher in Windschitl and Sahl's (2002) study (Stephan) pedagogical beliefs did not significantly change with the incorporation of the laptops in the middle school. He used the technology because he was required to but he did not change his core beliefs or his pedagogy to reflect the technology requirement. Ertmer (2005) states that beliefs like Stephan's concur with other teachers' beliefs on technology: "some teachers may think of technology as just another tool they can use to facilitate student learning, others may think of it as one more thing to do" (p. 30).

The final teacher observed in Windschitl and Sahl's (2002) study (Julia), was initially excited to incorporate the laptop technology in her classroom, but her eventual negative experience about the technology usage outweighed the positive experiences she encountered. Thus her initial pedagogical beliefs did not change. The negative experience with technology can result in the rejection of the technology. Pajares (1992) states, "beliefs color not only what individuals recall but how they recall it, if necessary completely distorting the event recalled in order to sustain the belief" (p. 317). In addition, Pajares (1992) feels that once beliefs are held, individuals build causal relationships to justify the beliefs, which becomes a "self-fulfilling prophecy" where "beliefs influence perceptions that influence behaviors that are consistent with, and that reinforce, the original beliefs" (p. 317). The thick description of the first-hand accounts of the teachers in Windschitl and Sahl's qualitative study provide a contextual description of the experiences faculty face adopting new technologies into the classroom, which can

conceivably translate to a study on faculty perceptions of adopting virtual world technologies.

Faculty Perceptions and Epistemological Beliefs

To better understand faculty classroom practices, we should examine teacher perceptions and beliefs. "Early researchers considered beliefs to be the information a teacher held about a person, a group of people, a behavior or an event" (Fishbein & Ajzen, 1975, as cited in Luft & Roehrig, 2007, p. 38). Beliefs tend to be intrinsic and are based partly from experiences (Pajares, 1992). The experiences an individual has had over his or her lifetime contribute to the "fabric" of that individual. The epistemological view of an individual is reflected in the behavior of the individual. This epistemological view comes from within the individual and perhaps only a major revelation the individual has or experiences can change that epistemological view (Csikszentmihalyi, 1990). When an individual has experienced a change in an epistemological view, perhaps transformative learning has taken place: "Transformative learning occurs when there is a transformation in one of our beliefs or attitudes (a meaning scheme), or a transformation of our entire perspective (habit of mind)" (Merriam, Caffarella, & Baumgartner, 2007, p. 133). This section of the literature review examines faculty perceptions and beliefs, which could potentially affect the adoption of new teaching methods in the classroom (such as virtual world technology).

Grenier-Winther (1999) discusses faculty perception of adopting and diffusing virtual technology (although not specifically virtual worlds) in the classroom. She specifically discusses how much time it took her to prepare the conversion of her face-to-face French class to the online format. She addresses the large amount of time it took her to write the course, the assignments, the tutorials, quizzes, as well as "learning HTML

and multimedia web authoring, consulting with programmers, negotiating server space and student access to computers, to beta-testing the tools" (p. 261). In addition to the initial course re-structuring, the author states that the course took so much more time to teach than her face-to-face class, since she had to email the students constantly in order for the students to feel engaged and connected to the course and the instructor (Grenier-Winther, 1999).

Grenier-Winther also addresses faculty concerns about receiving recognition and reward for spending so much time and effort reworking traditional face-to-face classes to online delivery. She asks if untenured faculty are willing to do this extra work if they are not "encouraged and rewarded, both morally and tangibly" (Grenier-Winther, 1999, p. 262). She also questions whether the faculty member who develops the online course owns the materials they develop – or the university or college own the materials. However, Grenier-Winther does not answer the questions she poses in her article and does not suggest that future research be performed to address these questions. She concludes that she will continue teaching the French class online since it does meet the needs of students who must have the flexibility her course offers. In reviewing Grenier-Winther's article in relationship to her feelings and beliefs about the immense amount of time it took her to convert her face-to-face class into an online course, it appears that faculty in higher education institutions might be hesitant (or not able) to spend the amount of time necessary to incorporate virtual worlds into their existing or future classes.

Pajares (1992) examines teachers' beliefs and the differences between their beliefs and their knowledge. Pajares' article addresses teachers' pedagogical beliefs as

well as teachers' "knowledge," and the differences and similarities between the two. Pajares discusses the daunting task of distinguishing knowledge from beliefs and the confusion that many have when trying to determine what is knowledge and what is a belief. In the article, Pajares (1992) cites studies from Nespor (1987) and Rokeach (1968) in an attempt to illuminate the differences between knowledge and belief as far as the effect on teachers teaching:

> Beliefs influence what teachers say outside of the classroom, but their behavior inside of the classroom is a result of beliefs (and here's the twist) being filtered by experience. Knowledge on the other hand, represents efforts to make sense of experience, and thus knowledge, not belief, ultimately influences teacher thought and decision making. (p. 312)

The article demonstrates how teachers' beliefs and knowledge constructs are interwoven and intertwined. Pajares (1992) points out that self-efficacy affects the way people perceive themselves, which can translate into beliefs and behavior. Pajares states: "beliefs are basically unchanging, and, when they change, it is not argument or reason that alters them but rather a 'conversation or gestalt shift' (Nespor, 1987, p. 321, in Pajares, 1992, p. 311). Pajares continues by stating that knowledge can be critiqued and examined but beliefs cannot be examined so easily ("knowledge is fluid," p. 312, whereas beliefs are stagnant). Pajares cites several researchers in his article collaborating his own theories on beliefs versus knowledge. He states that beliefs are more a "school of thought" domain (Pajares, 1992, p. 312) versus knowledge, which is portrayed as a non-emotional, practical, and objective domain.

Pajares (1992) suggests that teacher's beliefs can possibly be influenced by experiences the eventual teachers have had while being a student themselves:

> These beliefs about teaching are well established by the time students get to college. They are developed during what Lortie (1975) called the apprenticeship of observation that takes place during the many years students spend at school. They include ideas about what it takes to be an effective teacher and how students ought to behave, and though usually unarticulated and simplified, they are brought into teacher preparation programs. (p. 322)

Moreover, Pajares cautions that some studies demonstrate that pre-service teachers have their own construct of the attributes of the 'ideal type' of teacher which includes beliefs that their own perception of an 'ideal type' of faculty is the only perception that counts, insinuating that "they will be better teachers than their peers" (Parjares, 1992, p. 323).

The research behind Pajares' (1992) assumptions is obtained from a meta-analysis research approach. Pajares synthesizes the research to derive a consensus between the research studies cited in this article. One of the research methods that Pajares proposes is using qualitative research methods when studying beliefs. He states: "Munby (1982, 1984) suggested that qualitative research methods are especially appropriate to the study of beliefs" (Pajares, 1992, p. 327). Thus, suggesting that a mixed methods research approach (which would include qualitative inquiry) would be an appropriate research approach.

Ertmer (2005) discusses the importance of addressing faculty pedagogical beliefs about classroom instruction when determining whether a technology innovation has the potential to integrate into the classroom. Ertmer (2005) advocates a:

> Second order change – change that confronts teachers' fundamental beliefs and, thus, requires new ways of both seeing and doing things. While first-order changes are, in effect, reversible, second-order changes are seen as irreversible. Once you begin, it is impossible to return to your previous routines and habits. As such, these types of

> changes are riskier for teachers, as well as more difficult to achieve. (p. 26)

Ertmer's (2005) article examines the differences between teacher's pedagogical beliefs and the transfer of those beliefs into classroom instruction. Even though the literature Ertmer researched for her article suggests that incorporating new technologies will encourage teachers to lean towards constructivist approaches in teaching, she states that empirical research has not been performed to substantiate the assumption.

Ertmer (2005) references Pajares (1992) in her article, stating that (teacher's) beliefs are stronger, thus perhaps more influential than knowledge. Etmer acknowledges Pajares' recommendation that teacher's pedagogical beliefs and their beliefs on incorporating technology in the classroom are intertwined. It is the goal of Ertmer's article to present an apparent relationship between teacher's pedagogical beliefs and their knowledge and experience of adopting technology into their teaching. Ertmer points out that if a teacher has a negative experience with a technology innovation in the past, then perhaps that negative experience will transfer to another technology innovation in the future. Furthermore, Ertmer (2005) suggests the relative advantage (supporting Rogers, 1993, adoption attributes theory) of a technology might be to:

> Introduce the teachers to the types of technology uses that can support their most immediate needs. At the very least, this should increase teachers' confidence for using technology so that, over time, higher level uses become more plausible. (p. 36)

To provide the reader evidence that her theories about teacher beliefs to understand teacher behavior are indeed probable, Ertmer (2005) cites other research articles and studies on the subject. Besides Parajes (1992), Ertmer discusses studies by

Calderhead (1996), Clark and Peterson (1986), and Kane, Sandretto, and Heath (2002) to support her assumptions. Ertmer's research is a meta-analysis. She makes her assumptions based on secondary studies. Even though Ertmer specifically details research methods employed by the researchers she cites, she might provide more insight and further collaborate the meta-analysis by performing her own research study based on her hypotheses. Ertmer openly suggests that further research be performed on teacher beliefs and asks questions to promote further research on the subject. Ertmer concludes that the literature that exists does not specifically address teacher beliefs and subsequent changes to their pedagogical beliefs as it relates to incorporating new technology in the classroom. Had Ertmer performed her own research study and provided her empirical research findings in this article, she could have contributed to the research in the field, which could possibly provide her either an acceptance or a rejection of her hypotheses.

Rodriguez and Knuth (2000) state that teachers must focus on learning to use technology as tools for teaching in the classroom in order to engage students in the learning. The authors cite a study by the National Institute for the Improvement of Education, which "found that 73 percent of surveyed teachers cited improved student achievement as the most important reason for participating in professional development activities" (Rodriguez & Knuth, 2000, p. 3). Providing faculty development opportunities can increase self-efficacy in faculty (Jacobsen, 1998), which possibly in turn can affect faculty perceptions and beliefs about using technology. This article defines gaps in technology training for faculty development in higher education. Rodriguez and Knuth define an effective faculty development program and the resources needed to successfully implement this type of program. A plan of action is discussed in implementing faculty

development programs for using new technologies in this article, but there is no research conducted by the authors to support their argument. Rodriguez and Knuth use illustrative cases in this article to support their assumptions, but only a brief paragraph is cited on the four cases, omitting any data collected from the cases.

Being able to change faculty attitudes and beliefs is a key element in advancing technology integration, according to Christensen (2002). In addition, Christensen emphasizes proper faculty development in the use of technology in the classroom as an important element to successful integration of the technology: "the instructor who has learned to integrate technology into existing curricula may teach differently than the instructor who has received no such training" (p. 413). The purpose of the research in this article is to determine a relationship between teacher attitudes towards technology integration and the attitudes of their students. The method employed in this research involved faculty development workshops training faculty on how to integrate computers into the classroom. Sixty elementary teachers participated in the study. The instrument used to collect data was the Teachers' Attitudes Toward Computers Questionnaire (TAC), to collect data about attitudes. The results of this study showed "little doubt that the way teachers view technology affects the attitudes of their students" (Christensen, 2002, p. 429).

Lumpe and Chambers (2001) studied teachers' context. They developed a measurement instrument to assess teachers' attitudes and behaviors in reference to using technology in the classroom. Lumpe and Chambers concur with Pajares (1992) about teachers having prior beliefs about technology use "and that these beliefs are most likely formed during time spent in the classroom either as students or teachers" (Lumpe &

Chambers, 2001, p. 94). Self-efficacy is another recurring theme in this article (as seen in Duncan, 2005, Pajares, 1992, and Straub, 2009). The goal of this research study was "effective use of technology in the classroom in an engaged learning environment" (Lumpe & Chambers, 2001, p. 94). The relationship of the context of beliefs is discussed in reference of how the environment (the physical environment, the people, the tools, and the support for professional development) affects the adoption of technology in the classroom.

Lumpe and Chambers (2001) studied two groups of teachers for their research study. One group of 20 teachers developed the beliefs survey instrument (Beliefs About Teaching with Technology - BATT) and the other group of 307 teachers tested the survey instrument. A question was included within the survey that specifically asked the teachers if they believed a technology innovation would make them a more effective teacher (Lumpe & Chambers, 2001). In addition, the survey instrument used measured self-efficacy, known as the Microcomputer Utilization in Teaching Efficacy Beliefs Instrument (MUTEBI) and included the Engaged Learning Profile Tool (Lumpe & Chambers, 2001). The results of the tests indicate, "contextual factors impacting teachers' beliefs about technology were found" (Lumpe & Chambers, 2001, p. 103), indicating positive Enable beliefs (Enable beliefs are defined here are those beliefs that are deemed as possible or practical). However, a significantly lower score on the Likelihood beliefs (Likelihood beliefs are deemed as the actual probability that an event will occur) infers that the teachers do not believe that the technology will actually be implemented in their school (Lumpe & Chambers, 2001). The BATT survey instrument used in this study appeared reliable in measuring teachers' beliefs about incorporating technology and the

perceived need for faculty development programs to learn how to use the technology (Lumpe & Chambers, 2001). Finally, Lumpe and Chambers suggest further research in studying teachers' context beliefs, since introducing technological innovations can result in a change of behavior.

Faculty Perceptions of the Affordances of Using Virtual World Technology in the Classroom

Affordances of using virtual world technology in the classroom include the effect this technology potentially has on student learning outcomes. According to the literature reviewed for this section, some faculty perceive that students can potentially become more engaged in the subject matter when learners can construct their own learning within a virtual environment (Kluge & Riley, 2008).

Kluge and Riley (2008) describe how virtual worlds "incorporate constructivist, experiential, and student-centered learning practices into the classroom" (p. 127). The authors discuss how traditional classrooms are still using old technologies (such as chalkboards) and that digital technologies need to be incorporated into the classroom in order to expand learning opportunities for students. Kluge and Riley (2008) state that learning does not have to be held in a building in order to facilitate learning:

> "Learning has become an activity where location is increasingly less important. Learning is no longer limited to a building with four walls, but can take place anytime, anywhere, facilitated by increasingly ubiquitous digital information and communication technologies" (p. 128).

The authors assert that virtual worlds create new opportunities for learners to create their own learning environment within a virtual environment, such as *Second Life*. The nature of a MUVE allows the user to explore while learning, constructing their own knowledge as they explore the virtual environment. Since users of MUVEs and MMORPGs create

their own character (known as an avatar), the individual user can either reflect his or her own personality and/or physical characteristics or create a completely fictional avatar (Kluge & Riley, 2008). The act of creating an avatar could possibly be considered an affordance to using virtual worlds, since the user explores different ways to represent himself or herself through the creation of his or her avatar. The MUVE, *Second Life* allows the users to create their own avatar, their own virtual environment, and has the capability to build three-dimensional objects that can be used and seen by others in the MUVE (Kluge & Riley, 2008). Other affordances of using virtual world technology in the classroom include the flexibility to create customized environments, which can be applicable to multiple learning environments and different academic subjects (Kluge & Riley, 2008). This article describes how virtual worlds have the potential to create experiential learning environments, which could perhaps engage students in learning.

Kluge and Riley (2008) discuss that even though *Second Life* was not created as an educational tool, educators are using the MUVE in the classroom: "Faculty can integrate text information in the form of note cards and use Web sites, content slides, video, and audio in addition to creating 3-D objects" (p. 132). Another affordance of virtual world technology is the opportunity to shift from a teacher-centered classroom to a learner-centered classroom, encouraging discovery learning (Kluge & Riley, 2008). Kluge and Riley believe that faculty can transition from teacher-centered classrooms to learner-centered classroom within the virtual environment, since the learners tend to construct their knowledge within this type of environment. Authentic learning can be seen in virtual world learning environments. The transfer of knowledge of learning strategies can occur from the real world to the virtual world by the learners implementing

role-playing and problem-solving activities in the virtual world (Kluge & Riley, 2008). According to the authors, "student-centered models of instruction often incorporate constructivist learning theories in which learners use their experiences to actively construct understanding that makes sense to them, rather than have understanding delivered to them in already organized form" (Kluge & Riley, 2008, p. 130).

Kluge and Riley (2008) discuss the affordances and challenges that teachers face using virtual worlds in the classroom, but do not cite any research studies performed. Kluge and Riley's article supports the theory that higher education institutions will need to consider adopting immersive methods of teaching in order to perhaps engage today's college students. The authors also point out that, "digital technologies not only change what students should learn, but what students can learn" (Kluge & Riley, 2008, p. 128), supporting the theory that students perhaps could learn more using virtual worlds technology in the classroom versus using the traditional face-to-face classroom teaching methods, such as whiteboards, chalkboards, and paper and pencil note taking. Thus, perhaps virtual world technology might be perceived as an affordance to faculty in the classroom.

Duncan (2005) addresses finding a flexible way to continue faculty development while employed full-time. The purpose of this study is to observe the reactions of instructors and graduate students to their first experience with an online course. Since this study is a case study, the data collection followed qualitative methodology. The data were collected using "multiple electronic sources as well as from final face-to-face semi-structured individual interviews" (Duncan, 2005, p. 877). The electronic sources included an online discussion board, electronic journal entries, emails, as well as interviews of the

students and instructor (although the number of interviews was not specified). The qualitative data were collected over a period of four months, during the time period the online course was taken by the students studied. Eight students were initially enrolled in the course but two dropped out during the first week. The final taped face-to-face interviews of the students enrolled were conducted lasting anywhere from 60 to 90 minutes in length. The tapes were transcribed and reviewed by each individual taped (for accuracy). The data were analyzed with ATLASti (an application that codes data such as text and multimedia). Eight students plus the instructor were initially involved in the case study. The demographics in this study are cited as: "Five of the participants were female and three were male. Ages ranged from late 20s to late 40s. Professional experience varied from four years to over twenty-five years" (Duncan, 2005, p. 878).

The main results of the findings in Duncan's study are as follows: The participants seemed to enjoy the challenge of the online course, and learned new skills, which in turn increased their self efficacy. Even though there were frustrations with using the new technology, the participants were able to share their experiences and frustrations with their fellow participants to form a community of learning. Internal motivators (such as increased self-efficacy, self reflection, and exploration) appeared to outweigh the external motivators (such as higher salaries, better employment, and pensions) in the outcome of the study. Duncan (2005) states: "Evident from this study was the greater the immersion of self in the learning process, the higher the intrinsic rewards derived from the experience" (p. 891). The participants cited that self-learning and self-efficacy was the highlight of the online course studied in this research. This article demonstrates that participants in an online class can potentially respond favorably to immersive learning

techniques, focusing on intrinsic motivators rather than extrinsic motivators. Even though Duncan's research focuses on online course delivery versus virtual world environments, the favorable immersive learning aspects of this study relate to the potential affordances of immersive learning capabilities of virtual world environments.

Steinkuehler and Duncan (2008) collected data from random samples of 1,984 posts on threads of participants playing *World of Warcraft* (a MMORPG). This study showed 86% of the discussion demonstrated problem-solving techniques through discussion, which could be used in the classroom. The potential of "social knowledge construction" (p. 530) in science reasoning through virtual world technology is discussed in the Steinkuehler and Duncan article. The purpose of the study in this article was to examine the "scientific habits of mind" (p. 530) and inclinations of posting in the discussion forums of the MMORPG, *World of Warcraft* (Steinkuehler & Duncan, 2008). In the study, the authors discuss how proper thinking habits for science have not been fostered in colleges and how typical inquiry learning activities did not encourage scientific ways of thinking, "but in fact actually fostered epistemological beliefs directly antithetical to them" (Steinkuehler & Duncan, 2008, p. 530). The research used in this study is an epistemological framework that emphasizes the scientific frame of mind found in the discussions held within the MMORPG's forums (Steinkuehler & Duncan, 2008). The data collection analyzed in the study consists of the discussion threads from the "priest forum" in 2006 from the *World of Warcraft* (WoW) website (Steinkuehler & Duncan, 2008). In this forum, there were over 270,000 discussion threads that had the potential to be analyzed. The authors chose to limit their data collection to a single topic in the forum (single character class-related topics) by randomly choosing 1,984 posts

amongst 85 threads, “resulting in a confidence level of 91%” (Steinkuehler & Duncan, 2008, p. 532). Sets of codes were developed to examine the data collected. Steinkuehler and Duncan (2008) discussed the reasoning behind selecting the codes “based on a combination of a priori assumptions about the forms of scientific reasoning such spaces ought to generate, previous games related literature, and a pilot study conducted in preparation for this investigation” (p. 532). A second set of codes was developed to analyze the *World of Warcraft*-specific discussion in each post. Steinkuehler and Duncan (2008) used “two raters, both with over a year of participant-observer experience within the game, coded the data; two-way inter-rater reliability, calculated again roughly 10% of the corpus, was 93%” (p. 533). Therefore it appears that enough data were collected, the sampling procedure was a valid one, and the study appears trustworthy.

Christensen (2002) presents a research study performed with teachers and their students on their attitudes towards integrating technology into the classroom. It appears from the research performed in this study that the attitudes of students towards technology also affect the attitudes of teachers. As an example, Christensen states in her article that if the students are anxious about using technology, the teachers are, in turn, anxious. Christensen’s study includes citations from other studies showing that students’ attitudes towards learning affect their achievement in the classroom. Even though Christensen’s article focuses primarily on faculty attitudes and beliefs, the effect that teachers’ attitudes have on students’ attitudes is evident in the article.

Reigle and Matejka (2005), acknowledge that MMORPGs, such as *EverQuest II*, are instructional systems, where users must apply certain skill sets and information acquired in order to be successful in playing the game. The purpose of this article is to

examine how Hunter's Lesson Design system can be applied to MMORPGs and the advantages of using MMORPGs. Reigle and Matejka list the eight elements of Madeline Hunter's Lesson Design and examine how the eight elements relate to today's MMORPGs, noting how today's teachers, "would clearly benefit from exposure to MMORPG design theory and collaboration with MMORPG designers" (Reigle & Matejka, 2005, p. 7). While Reigle and Matejka's article demonstrates the advantages for today's teachers to consider using MMORPGs (a virtual world technology) as an instructional tool, there is no research evidence to support their theory contained within this article.

Hodge, Tabrizi, Farwell, and Wuensch (2007), claim that using virtual worlds or environments as a teaching tool in the classroom benefit students by offering interactive learning environments. The purpose of this study is to show how virtual environments stimulate social knowledge construction and collaboration transferring to educational settings, which is appropriate for "the Net Generation also known as Generation Why" (Hodge, Tabrizi, Farwell, & Wuensch, 2007, p. 105). The research in this study was designed to examine the effectiveness of the use of virtual environments as a delivery mode of instruction in the classroom. The research instrument was a web-based survey created by Perseus software administered to students enrolled in East Carolina University's (ECU) distance education courses (over 4,000 students are enrolled in ECU's distance education courses) through the Agent-based Virtual Reality (AVR) system "to determine the level of engagement and social presence" (p. 107) over a period of five weeks (Hodge, et al., 2007). The results of the study show that the perceived satisfaction levels of those participating in the study of the AVR system were high

(Hodge, et al., 2007). The research study conducted was a quantitative one, with a scale of "1 (extreme dissatisfaction) to 5 (extreme satisfaction)" and the midpoint of the scale set at three (Hodge, et al., 2007, p. 109). Results of the study showed a "lack of statistical significance" but Hodge, et al. (2007) feel that nevertheless that "some of the sample correlation coefficients were large enough to be of some interest" (p. 109). The conclusions made by the authors in this research study allude to the research performed in the study as somewhat successful with student satisfaction "relatively low on four items" of the survey and "relatively high on five items" in the survey with the mean at 3.23 and the median at 3.18 (Hodge, et al., 2007, p. 109), which would possibly indicate an advantage to faculty using this type of technology. The conclusions the authors make in regards to the research show the mean and median of the research results over a 3.0 (on a scale of 1 to 5). The data collection methods utilized in the study are described in detail and appear systematic. The authors suggest, however, that further research on the AVR system should be performed and assessed to ensure that its "ability for developing social networks for on and off campus students" (Hodge, et al., 2007, p. 109) is addressed in the future. Hodge, et al. assert that educators need to address the Why Generation's need for interactive learning methods, combining traditional learning theories with new technologies as they develop.

In assessing Hodge, Tabrizi, Farwell, and Wuensch's (2007) study, the limitations of the study should be reviewed. The authors state that a potential limitation of their study possibly includes the population surveyed for the study as well as the low response rate (Hodge, et al., 2007). Another limitation of this study (which is not indicated by the authors) could include possible researcher bias. According to Hodge, et al., the AVR

system used in this study was designed by one of the authors (Tabrizi). In addition, a further limitation of this study possibly includes the survey instrument utilized, since no validation (other than the Perseus software testing capability) was documented. Finally, evidence is lacking in assisting in determining the trustworthiness of the study. Nevertheless, the Hodge, et, al. article does suggest using immersive technologies (such as virtual world technology) as a teaching method to create a social presence, which could be perceived as an affordance to faculty.

Mullen, Beilke, and Brooks (2007) discuss the possibilities of including virtual environments in educating today's teachers by using two pedagogical studies as examples in a meta-analysis. In their article, the authors stress the importance of pre-service teachers creating "alternative identities" becoming aware "of the constructed nature of social categories and gain the essential pedagogical skill of perspective-taking" (Mullen, Beilke, & Brooks, 2007, p. 22). The authors cite two articles and two research studies in their meta-analysis as support for their argument. Field experience is discussed as an important part of the educational experience for pre-service teachers by relating field experience directly to teachers using virtual worlds as a type of field experience. Mullen, et al. give pedagogical examples of universities using MUVEs and MMORPGs, such as *Second Life* and *World of Warcraft* as learning tools for faculty, staff, and pre-service teachers, citing the advantages that virtual world technology offers faculty. This article cites one study at Illinois State University where three faculty members were using World of Warcraft (WoW) to teach an undergraduate class in social foundations (Mullen, et al., 2007). The objective of this study was "to develop new metaphors for the pedagogical use of technology (specifically, virtual environments)" (p. 25). Another

objective was that the player needed to use his or her imagination and be perceived as creative and be "open to cognitive dissonance" (p. 25). In the Illinois State University study, the participants were required to role-play to comprehend how others interact within the social foundations structure, where active participation (versus passive) was required of those involved in the study (Mullen, et al., 2007). Moreover, this study provided an opportunity for the participants to role-play as educators within the environment, allowing the participants "to switch positions and roles and operate within different worlds" (Mullen, et al., 2007, p. 27).

Another study at Ball State University is cited in the Mullen, et al (2007), article where students were recruited for a class being held within *Second Life*. The email requests for student participation in the class resulted in 300 responses to the inquiry for enrollment. Interested students were interviewed prior to enrolling in the course (Mullen, et al., 2007). Journaling, blogging, and observation were the methods of data collection. The students in the study were asked to interview a *Second Life* avatar to determine the personality of the student / character and "purpose of being in *Second Life*" (Mullen, et al., 2007, p. 26). Nevertheless, the results from the study were not revealed in this article. The only mention of the culmination of the study was that the students enrolled created a "fun space" (p. 26). The conclusion of the article is brief yet it emphasizes that using virtual environments in learning "offer the student the ultimate freedom not only to free one's mind but also to create one's world" (Mullen, et al., 2007, p. 26). Mullen, et al. promote the theory that virtual learning environments encourage students to immerse themselves in learning through interactive learning environments, thus demonstrating that virtual world technology could be perceived as an affordance to faculty.

Coffman and Klinger (2007) explore virtual environments and how they can be used in the classroom, specifically *Second Life.* Coffman and Klinger state that *Second Life* can be used to engage students in such a way that students discover as they learn (discovery learning). Coffman and Klinger (2007) also refer to today's students as "digital natives," (p. 29) agreeing with Marc Prensky's (2001) term. This article covers teaching and learning strategies, using virtual worlds as a constructivist approach to teaching and learning, as well as discusses the potential and the advantages that virtual worlds has for teaching and learning. A survey on students engaged in virtual world technology is discussed in Coffman and Klinger's article, with no specific details on actual research performed, no evidence of any data collection, or results of research related to the authors' theories. Nevertheless, Coffman and Klinger's article addresses the need for educators to consider implementing virtual environment technology, such as *Second Life*, into the classrooms, if the technology meets the instructional needs of the class. Thus, the Coffman and Klinger's article implies that virtual world technology could be considered an affordance to faculty who adopt the technology in the classroom.

Faculty Perception About the Challenges of Using Virtual World Technology in the Classroom

To address faculty perception about the challenges of using virtual world technology in the classroom, this section of the literature review will focus on the barriers that faculty perceive they face when adopting new technologies. The literature reviewed for this section includes barriers and challenges for faculty adopting new technologies in general, which could perhaps translate to the adoption of virtual world technology. If faculty perceive there are barriers to adoption of an innovation (such as virtual world

technology) or have had a negative experience with a technology innovation in the past, then potentially that negative experience could perhaps transfer to another technology innovation in the future (Ertmer, 2005).

Albright (1996) contends that faculty members do not think that the administration supports the adoption and diffusion of emerging technologies in the classroom. He states that faculty believe that administration sees technology adoption "as a 'black hole' for money that is an easy target for budget cuts when funding gets tight" (Albright, 1996, p. 8). Arguably, Albright wrote this keynote speech in 1996, when instructional technology in the classroom was not as advanced or as widely used as it is today. However, some of the same perceived technology issues that faculty faced in 1996, are still possibly perceived by faculty teaching today.

Albright (1996) outlines the reasons that faculty might see as barriers to adopting and diffusing emerging instructional technologies. They are as follows:

- Faculty conservatism and a commitment to traditional means of teaching.
- A reward system that penalizes faculty for concentrating on teaching instead of research.
- Lack of commitment to technology at the highest echelons of the administration.
- Dominance of the 'bean counter' mentality and a preoccupation with productivity and cost savings.
- Poorly-equipped classrooms.
- The lack of financial plans that provide for the annual purchase, maintenance, and support of technology.
- Cries of lack of evidence that technology actually works.
- Faculty frustration with unreliable or difficult to use equipment.
- Disproportionate access.
- The rapid pace of change and the speed in which expensive new technologies become obsolete.

- Lack of faculty knowledge about technology and available resources.
- Lack of time. (pp. 8 – 9)

The perceived barriers that Albright presents in his keynote address reflect the views in the literature reviewed for this study (Beggs, 2000; Duncan, 2005; Ertmer, 2005; Kluge & Riley, 2008). Albright's assertions that faculty should adopt new technologies (which could include virtual world technologies) to engage students in the subject being taught are inline with other research reviewed.

Duncan (2005) discusses challenges faculty face with hardware issues when developing virtual classes. Unreliable and slow Internet connection is cited as possible negative aspects of using an online course in faculty development. This research study addresses online faculty development, but not specifically virtual worlds. However, the study can be generalized to the types of challenges faculty face in virtual learning environments, since much of the technology is similar.

Kluge and Riley (2008) discuss the potential of virtual worlds in higher education as potentially being a challenge for faculty. The authors assert that challenges for faculty include hardware and Internet connection limitations in colleges and universities (agreeing with Duncan, 2005). Other challenges that the authors discuss include creating classes in virtual environments, which require knowledge and skills that many faculty in today's higher education institutions do not possess, thus supporting the theory that the learning curve for faculty might be a high one (Kluge & Riley, 2008). Liability issues (such as students possibly being subjected to undesirable behavior by other participants in the virtual world: "virtual violence, virtual assault, and sexual harassment that take place"), cost issues, and learning management issues also present a challenge for faculty

using virtual technology, such as *Second Life* in their classes (Kluge & Riley, 2008, p. 131).

As stated previously, while Kluge and Riley's (2008) article supports the theory that virtual world technology has both affordances and challenges for students and faculty, no evidence of research performed to support the theories presented is represented in this article. The authors discuss future research plans which have "the potential to address questions about acceptance of virtual worlds by more technologically literate faculty and students" (Kluge & Riley, 2008, p. 133), but do not specifically state how this research will be performed or which research methodologies will be used. In addition, the authors only speculate on future research considerations.

Riegle and Matejka (2005) reflect on the opinion of some educators' beliefs about virtual world technology in admitting that, "some educators argue that academic content cannot be transmitted through MMORPGs. Others will say that MMORPGs have no connection to the real world" (p. 6). In a subsequent article that Riegle and Matejka (2006) wrote, the authors contend that in classes conducted in MMORPGs (or virtual environments), the teachers have less control over the class, which might be perceived as a barrier or a challenge for some faculty. On the other hand, the authors point out that by having less control, students might actually learn more by taking ownership of their learning (Reigle & Matjka, 2006). Conversely, faculty might not know how to incorporate virtual world technology (such as a MMORPG) in their courses, which presents an additional challenge to faculty (Reigle & Matjka, 2006). While both of Riegle and Matejka's (2005, 2006) articles discuss the affordances and challenges of adopting

virtual world technology into the classroom, there is no evidence or citing of actual research performed to support the authors' claims.

Grenier-Winther (1999) reflects on the barriers she faced when converting her face-to-face French class to a virtual class at Washington State University. Even though Grenier-Winther's class was an online class versus a class using virtual world technology, some of the challenges she faced converting her face-to-face class are possibly similar to a teacher converting a face-to-face class to a virtual world format. She discusses that she has taught the French class twice face-to-face and four times as an online class. Fifteen students were enrolled in the pilot course she taught in 1996. The students appeared to welcome the online format of the class: "Students in FRENCH 306 were unanimous in their approval of the online format, especially as it allowed them to work at their own pace and schedule" (Grenier-Winther, 1999, p. 257). However, the students admitted that they were not as self-disciplined as they needed to be in order to be entirely successful in the class (Grenier-Winther, 1999). The students also admitted to feeling isolated when working asynchronously and the instructor changed her methods by being "visible" when students were online. Grenier-Winther (1999) observed that the students felt even more isolated when the other students were not online. Thus, the instructor designed collaborative assignments, where the students worked in groups, constructing their own knowledge as they worked together (Grenier-Winther, 1999). Since the pilot course, Grenier-Winther noticed that the quality of the collaborative assignments rose and the discussion became more active between the students in subsequent classes.

Grenier-Winther (1999) used the classes that she taught (two face-to-face and four online) as the data for the background behind her article. She discusses pedagogical issues associated with teaching virtual classes, including barriers that faculty face. She states that if the course is not "pedagogically sound" (Grenier-Winther, 1999, p. 256), then the course will not be successful, whether the technology involved is appealing to the students. She also states: "Technological enhancements applied to a course with clearly delineated objectives and desired student outcomes, on the other hand, can make the learning experience more compelling for both student and instructor" (Grenier-Winther, 1999, p. 256). In addition, the author points out that a challenge in converting classes to virtual environments includes providing an orientation for students to expose the students to the technology involved in the virtual class, which can take considerable time, depending on the students enrolled in the class.

In exploring challenges that faculty face when adopting new technologies (though not specifically virtual world technology) Beggs' (2000) research uncovers common adoption challenges as well as aspects that assist in defeating the challenges. Beggs cites the fear of failure as a reason that faculty resist in adopting new technologies into their teaching. Faculty are subject matter experts (SMEs) in their field of study and are confident teaching the subject matter, but are not so confident when it comes to adopting technology (Beggs, 2000). Faculty fears of technology are exacerbated when problems occur using a new technology, perhaps preventing the use of the new technology in the future (Albright, 1996, in Beggs, 2000).

Beggs (2000) performed a study on 348 faculty at the University of West Georgia. He used an adapted survey instrument to determine "faculty's self-reported knowledge

and use of technology, factors influencing their use of technology, and perceived barriers to the use of technology in the classroom" (p. 4). The return rate of the surveys was 44% for a total of 157 usable surveys (Beggs, 2000). The results of Beggs' (2000) survey showed that "equipment access and training" and "instructional technology's ease of use" (pp. 5 - 6) as well as "a faculty member's personal comfort level with technology" (p. 8) were a high concern faculty held in regards to providing instruction. In addition, in the open-ended question section of the survey, faculty listed six barriers to adopting technology (Beggs, 2000). The barriers listed are as follows:

- Lack of time
- Lack of easily accessible equipment
- Lack of training
- Lack of personal interest in technology
- Lack of relevance to a faculty's discipline
- Lack of contribution to professional development. (Beggs, 2000, pp. 8 – 9)

While Beggs' (2000) survey results shows significant concerns faculty have in regards to adopting new technology, Beggs does not address the implications of this study. Furthermore, Beggs does not offer any suggestions for future research that may address the concerns the faculty listed in the survey results. Though not specifically related to faculty perceptions of the barriers or challenges to using virtual world technology, it may be reasonable to presuppose that the same concerns faculty have in regards to adopting new technology in general could apply to virtual world technology adoption.

Ertmer (2005) indicates that "it takes five or six years for teachers to accumulate enough expertise to use technology in ways advocated by constructivist reform efforts" (p. 27). Therefore, it appears that Ertmer suggests that time presents itself as a possible

barrier for adoption of new technologies as an instructional reform (agreeing with Beggs, 2000). By the time the teachers learn the new technology, the new technology may be replaced by an even newer and more relevant technology (Ertmer, 2005). As Ertmer (2005) so aptly states: "Ultimately, the goal is to facilitate uses of technology that lead to increased student learning" (pp. 27-28).

Rogers (2000) examines barriers to adoption of technology by higher education faculty pinpointing internal and external factors. According to Rogers, internal barriers to faculty adoption include attitudes, perceptions, and beliefs about technologies, including the actual ability to use new technologies. External barriers to faculty adoption include hardware and software accessibility and availability, institutional technology support, and faculty development opportunities to learn the new technologies (Rogers, 2000).

Rogers (2000) performed a study on 28 instructional technology coordinators (representing approximately 78%) of post-secondary two-year and four-year institutions in the Midwest. Rogers (2000) "consider(s) this study in terms of in-service teachers in higher education" (p. 465). The results of the study imply:

> Attitudes and perceptions of key individuals may become the major barrier to adopting any technology. Once past this component, potential barriers cluster within three major categories: availability and accessibility of hardware and software, appropriate stakeholder development opportunities for teachers at all levels of technology adoption, and appropriate and adequate technical and institutional support to initiate and maintain technology adoption in teaching and learning. (p. 467)

In Rogers' (2000) study, the teachers revealed that they do not feel that they have the support or the commitment from the institution in providing professional development for learning new technologies. Other concerns indicate that the time

commitment in learning new technologies is a barrier that the teachers face (Rogers, 2000). Rogers' study assists in determining perceived barriers faculty face when adopting technology into their teaching practices. Even though Rogers' study does not specifically address virtual world technology as the technology in this study, it stands to reason that similar barriers in technology adoption could apply to virtual world technology as it does to technology in general.

Summary of the Literature

In reviewing relevant literature, it is evident that there are resources, references, and research data available on the affordances of using virtual world technology in the classroom. Most of the research data available on the subject reflects upon the affordance of the adoption of virtual world technology on student learning outcomes, but there are gaps in the literature specifically on the perceptions and beliefs of higher education faculty in adopting virtual world technology in the classroom.

In the literature reviewed for this study, the adoption and diffusion process of an innovation as it relates to faculty adopting and implementing the use of virtual worlds in the classroom, and an examination of adoption theories was explored. Insights to why faculty adopt a new technology (such as virtual world technology) may be revealed through examining these adoption theories (Jacobsen, 1998; Johnson, Schwab, & Foa, 1999; Rogers, 2003; Sugar, Crawley & Fine, 2004).

Explored areas that provide a framework for understanding perceptions of faculty about using virtual world technology as a teaching method in their courses were examined in this literature review. In order to better understand faculty classroom practices, faculty perceptions and beliefs that potentially affect faculty behavior, were

also studied in the literature review (Ertmer, 2005; Grenier-Winther, 1999; Jacobsen, 1998; Lumpe & Chambers, 2001; Pajares, 1992).

The perceived affordance of using virtual world technology in the classroom was examined in the literature review to include the effect this technology potentially has on student learning outcomes. According to the literature reviewed for this section, some faculty perceive that students can potentially become more engaged in the subject matter when learners can construct their own learning within a virtual environment (Kluge & Riley, 2008). Therefore it is reasonable to ascertain that if faculty perceive a positive student learning outcome from incorporating an innovation as an instructional tool in the classroom (such as virtual world technology), faculty may see the innovation as an affordance. It would appear from the literature reviewed, that perhaps using virtual world technology in the classroom might be an affordance to design college faculty due to interactive-type majors that the design colleges offer. Perhaps design college faculty might engage their students in the non-major courses such as math, art history, or physics (courses that the students might not be engaged in otherwise), by using virtual world technology as a teaching method in the classroom.

Faculty perceptions regarding challenges of using virtual world technology in the classroom was also examined in the literature review for this study. If faculty perceive there are barriers to the adoption of an innovation (such as virtual world technology) or have had a negative experience with a technology innovation in the past, then potentially that negative experience will transfer to another technology innovation in the future (Ertmer, 2005).

There is evidence that some faculty use virtual world technology in the classroom. However, the research data are limited when it comes to determining perceptions of adopting and diffusing virtual world technology by higher education faculty. This study explores the perceptions of design college faculty about adopting virtual world technology in the classroom.

CHAPTER 3

METHODOLOGY

This chapter presents the context of the study, a description of the participants, and a statement of the researcher's role in the study. In addition, the chapter presents an explanation of the data sources, the data collection methods and analysis procedures, the limitations of the methodology, and a measure of trustworthiness.

Research Design

The primary purpose of this mixed methods study was to explore the perceptions of design college faculty regarding the use of virtual world technology in the classroom. The central question posed for this study was the following: What are the perceptions of design college faculty regarding the use of virtual worlds technology in their courses? Guiding questions for the research inquiry were: (a) What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? (b) What are faculty perceptions of the affordances of using virtual world technology in the classroom? and (c) What are faculty perceptions of the challenges of using virtual world technology in the classroom?

In order to provide the best chance to answer the research question posed in this study, a mixed methods research approach was used (Johnson & Onwuegbuzie, 2004). Johnson and Onwuegbuzie (2004) define mixed methods research as "the class of research where the researcher mixes or combines quantitative and qualitative research

techniques, methods, approaches, concepts or language into a single study" (p. 17). According to Creswell and Plano Clark (2007), mixed methods research is considered:

> A research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis data and the mixture of qualitative and quantitative approaches in many phases of the research process. As a method, it focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. (p. 5)

The mixed methods inquiry approach uses philosophical assumptions towards data collection and data analysis using both qualitative and quantitative approaches (Creswell & Plano Clark, 2007). The premise to this approach is that mixed methods can potentially provide a better understanding of the research problem than either one or the other approach by itself (Creswell & Plano Clark, 2007). By using a mixed methods approach to the research, quantitative data are used to compare measured items in conjunction with thick description about faculty perceptions, beliefs, and experiences in regards to adopting virtual world technology in their courses. In combining these research methods (quantitative and qualitative methods), perhaps a better understanding of the culture of the faculty can be made, and therefore a better comprehension on why a technology innovation is either adopted or rejected by faculty.

Context of the Study

The Research Setting

In order to explore faculty perceptions about incorporating virtual worlds technology into the classroom, 21 design colleges throughout the North America were included as the research setting for this study. The student population of the design colleges targeted for this study were ethnically diverse. The 21 colleges are located in

different cities across North America. The design colleges are located in urban areas, such as: Atlanta, Boston, Charleston, Chicago, Dallas, Denver, Ft. Lauderdale, Los Angeles, Las Vegas, Miami, Minneapolis, Nashville, Philadelphia, Pittsburgh, Portland, Salt Lake City, San Diego, Seattle, Tampa, Washington, D.C., and Vancouver, Canada.

The design colleges in this study grant bachelor's degrees, associate's degrees, and diplomas in applied arts subjects. The colleges in this study are private, proprietary schools, which are part of a group of design colleges, owned by the same corporation. The reason these colleges were targeted for this study is due to the interactive majors that the targeted colleges offer. The colleges in this study offer only majors in the applied arts field (such as graphic design, interior design, Web design, interactive media design, animation, advertising, photography, digital filmmaking, audio production, fashion design, illustration, video game programming, and motion graphics). These design colleges do not offer any majors in the general education field (such as science, math, English, foreign languages, humanities, social sciences, or history) or art foundations (such as drawing and painting).

Duration of the Study

The study (including the pilot study) took place over a period of one year. Preliminary data were collected as part of a pilot study consisting of a series of faculty workshops, which included a demographic survey, participant observations, online journaling, and participant exit interviews. In the summer of 2010, an email recruitment letter (see Appendix A) was sent out to the Deans and Faculty Development Directors at 43 design colleges across North America with a link to the Virtual Worlds Faculty

Survey (see Appendix B). Twenty-one of the 43 design colleges' Deans and Faculty Development Directors sent out the email recruitment letter to their respective faculty.

Human Subjects Protection

Informed consent forms were administered to the participants prior to answering any survey questions. The participants agreed that they read the informed consent form and agreed to participate in the research study prior to activating the survey online. An IRB was filed with Georgia State University and approved prior to research being performed (See Appendix C).

Participants

Sampling Strategy

The goal of a survey was to "produce statistics about a target population" (Fowler, 2009, p. 11). The target population for this research study was design college faculty. The potential sample for the Virtual Worlds Faculty Survey was 2,273 design college faculty. The sample for the study was the full-time and part-time faculty teaching during the summer 2010 quarter at the aforementioned design colleges across North America. Therefore, the sample for this research study was considered a convenience sample for the following reasons: the faculty recruited for the study were perhaps similar in teaching backgrounds; the faculty taught at a design college which was part of a larger group of design colleges; and the faculty were accessible to the researcher since the researcher works for one of the colleges within the group of design colleges (Minium, Clark & Coladarci, 1999). Even though the participants recruited for this study came from potentially 21 different design colleges, the colleges belong to one parent company. The

sample is also considered an intact group since all of the participants in the sample were potentially from all of the 21 design colleges, instead of just one design college.

Biweekly follow-up email reminders were sent out to the faculty in order to assist in facilitating an increased response rate. Cook, Heath, and Thompson (2000) state, "follow-up reminders will approximately double the response rate for email surveys" (p.831).

Demographics of the Sample

The first eight questions in Virtual Worlds Faculty Survey (Appendix B) addressed demographic characteristics, such as gender, age group, race, social computing applications used, courses taught, location of college, years taught in higher education, and whether the respondent had ever taught online distance education classes. The first question on the Virtual World Faculty Survey asked, "What is your gender?" The participants chose either: Male or Female. The Gender of the respondents were fairly equally distributed between males and females, with males at 49.4% and females representing 50.6% of the response percentages.

Question 2 of the Virtual Worlds Faculty Survey asked, "What age group are you in?" The participants chose from the following responses: Under 30; 30 – 39; 40 – 49; 50 – 59; or Over 59. The age groups represented by the participants were relatively equally distributed between the groups 30–39, 40–49, and 50–59, at 28.7%, 27.4%, and 27.1%, respectively. The largest response from an age group in this survey was from the 30–39 age group at 28.7%. Two respondents skipped the question about their age category.

Question 3 on the Virtual Worlds Faculty Survey asks the participant, "What is your race?" The participant chose from the following responses: American Indian or

Alaska Native; Asian; Black or African American; Hispanic or Latino; Native Hawaiian or Pacific Islander; White; or Other. The race of the sample showed the majority of the respondents as White at 79.9%, and the least represented group as the Native Hawaiian or Pacific Islander group at 0.3%. Two respondents skipped the question on the Race category. Table 1 illustrates the frequency and response percentage of the gender, age group, and race of the population responding to the online survey.

Table 1
Frequency Table – Gender, Age Group, and Race of the Sample

Variables	Groups	Frequency	Response Percentage
Gender	Male	163	49.4%
	Female	167	50.6%
Age Group	Under 30	17	5.2%
	30 – 39	94	28.7%
	40 – 49	90	27.4%
	50 – 59	89	27.1%
	Over 59	38	11.6%
Race	American Indian or Alaska Native	3	0.9%
	Asian	9	2.7%
	Black or African American	21	6.4%
	Hispanic or Latino	11	3.4%
	Native Hawaiian or Pacific Islander	1	0.3%
	White	262	79.9%
	Other	21	6.4%

It is not known if the percentages in Table 1 are representative of the population of faculty within all 43 design colleges due to the unavailability of the data from the participating colleges.

Question 4 of the Virtual Worlds Faculty Survey asked, “What social computing applications have you used? Please check all that apply.” Table 2 illustrates the types of computer applications used by the survey respondents.

Table 2
Frequency Table – ComputerApplications Used *

ComputerApplications	Frequency	Response Percentage
Facebook	268	81.5%
MySpace	115	35.0%
Wiki	118	35.9%
Blogs	168	51.1%
Twitter	91	27.7%
Multi-User Virtual Environments	57	17.3%
Massive Multiplayer Online Role Playing Games	36	10.9%
Other	78	23.7%
None	31	9.4%

** One respondent skipped the question*

Question 5, was an open-ended question where faculty participants provided the names of the courses they taught. The curriculum is standardized throughout the design colleges in this study, since the colleges are different branches of the same college system (located in different cities throughout North America). Thus, courses in one design college in one city directly correlate to another design college in another city. The standard design college course catalog was used in this study to identify the departments, which were used to categorize the courses into subjects for the SubjectTaught category. There are 18 different applied arts majors in the design colleges surveyed. All 18 majors are represented in this study. Table 3 illustrates the subject taught by the survey respondents.

Table 3
*Frequency Table – SubjectTaught**

SubjectTaught	Frequency	Response Percentage
Advertising	12	3.7%
Animation	16	4.9%
Art Foundations	26	7.9%
Audio Production	13	4.0%
Culinary Arts	23	7.0%
Design / Fashion Management	13	4.0%
Fashion Design	7	2.1%
Game Design	5	1.5%
Game Programming	1	0.3%
General Education	71	21.6%
Graphic Design	44	13.4%
Illustration	5	1.5%
Industrial Design	6	1.8%
Interior Design	12	3.7%
Motion Graphics	6	1.8%
Photography	28	8.5%
Video Production	18	5.5%
Web Design	22	6.7%

** Three respondents skipped the question*

Most of the respondents in this survey taught General Education courses (21.6%), such as English, math, science, history, humanities, psychology, and sociology. Graphic Design was the next highest group with 13.4%. Game Programming was the least represented area of teaching with 0.3%. Three respondents skipped the question about the subject taught.

Since a couple of the categories of variables had fewer than 15 cases, the affected variables were grouped (Rodeghier, 1996). The affected variable (SubjectTaught) was recoded to create new variables. SubjectTaught was recoded into categories of subjects that are considered related in the design colleges. Since the design colleges included in this survey had formally categorized majors (or programs) by an overall descriptive name, this study grouped the majors (or programs) into the designated categories that the design colleges already used. For example, for the Media and Interactive Design

category, subjects were grouped in this category that were either media related or interactive related, since both media and interactive were incorporated into the subjects included in this category. Table 4 reflects the recoding category for the SubjectTaught variable, which was renamed NSubjectTaught.

Table 4
*Recoded Subject Taught (NSubjectTaught)**

NSubjectTaught	SubjectTaught
Media & Interactive	Animation Audio Production Game Design Game Programming Motion Graphics Photography Video Production Web Design
Design	Fashion Design Graphic Design Illustration Industrial Design Interior Design
Art Foundations	Art Foundations
General Education	General Education
Culinary Arts	Culinary Arts
Marketing	Advertising Design / Fashion Management & Marketing

** Three respondents skipped the question*

Table 5 reflects the frequency and the response percentage of NSubjectTaught.

Table 5
*Frequency Table – NSubjectTaught**

NSubjectTaught	Frequency	Response Percentage
Media & Interactive	109	33.2%
Design	73	22.3%
Art Foundations	26	7.9%
General Education	71	21.6%
Culinary Arts	23	7.0%
Marketing	26	7.9%

** Three respondents skipped the question*

Question 6, was an open-ended question where the faculty respondents identified the college location where they taught. The data were initially grouped into colleges by state (since there were a few states that had more than one design college participating in the survey). By far the majority of the respondents in this survey were located in Georgia (38.7%). Perhaps the reason that the majority of the respondents were located in Georgia is due to the fact that Georgia has two design colleges that participated in this study, with a combined total of 268 faculty. Since I teach at one of the colleges located in Georgia, the Georgia faculty might have been more inclined to respond; since they were more likely to know me. The next highest group of faculty were located in California (14.7%). Massachusetts and Minnesota were tied with the fewest respondents (0.3% each). Six respondents skipped the question on the location where they taught. Table 6 illustrates the locations of the design colleges the location where the survey respondents taught.

Table 6
*Frequency Table – CollegeLocation**

CollegeLocation	Frequency	Response Percentage
Arizona	2	0.6%
California	48	14.7%
Canada (Vancouver)	14	4.3%
Colorado	5	1.5%
Florida	29	8.9%
Georgia	126	38.7%
Illinois	7	2.1%
Massachusetts	1	0.3%
Michigan	8	2.5%
Minnesota	1	0.3%
Pennsylvania	21	6.4%
South Carolina	14	4.3%
Tennessee	9	2.8%
Texas	11	3.4%
Utah	5	1.5%
Virginia	9	2.8%
Washington	16	4.9%

** Six respondents skipped the question*

Since the design colleges included in this survey had several colleges with only a few responses, the states were grouped into regions, recoding the CollegeLocation category. The new category for the CollegeLocation variable was renamed NCollegeLocation. Table 7 reflects the recoding category for the CollegeLocation variable, which was renamed NCollegeLocation.

Table 7
*Recoded College Location (NCollegeLocation)**

NCollegeLocation	CollegeLocation
South	Florida Georgia South Carolina Tennessee Texas Virginia
East	Massachusetts Pennsylvania
Middle States	Illinois Michigan Minnesota
Southwest	Arizona California Colorado Utah
Northwest	Canada (Vancouver) Washington

Table 8 reflects the frequency and the response percentage of NCollegeLocation.

Table 8
*Frequency Table – NCollegeLocation**

NCollegeLocation	Frequency	Response Percentage
South	189	59.6%
East	19	6.0%
Middle States	15	4.7%
Southwest	62	19.6%
Northwest	32	10.1%

** Six respondents skipped the question*

Even with the CollegeLocation category recoded into groups, the majority of the respondents in this survey were located in the South (59.6%). The next highest group of faculty were located in the Southwest (19.6%). The East group had fewest respondents with 6.0%. Six respondents skipped the question on the location where they taught.

Question 7 on the Virtual Worlds Faculty Survey asked, "How many years have you been teaching in higher education?" Table 9 illustrates the years taught in higher education by the survey respondents.

Table 9
*Frequency Table – YearsTaught**

YearsTaught	Frequency	Response Percentage
Under 1 year	17	5.2%
1 – 5 years	99	30.1%
6-10 years	83	25.2%
11-15 years	59	17.9%
16 – 20 years	24	7.3%
Over 20 years	47	14.3%

* *One respondent skipped the question*

Question 8 of the Virtual Worlds Faculty Survey asked, "Do you teach or have you taught online distance education classes?" Table 10 illustrates whether the survey respondents teach or have taught online distance education classes.

Table 10
*Frequency Table – Online Distance Education Classes Taught**

TeachOnline	Frequency	Response Percentage
Yes	78	23.7%
No	251	76.3%

* One respondent skipped the question

Data Sources and Collection

Survey Instrument

The purpose of the Virtual Worlds Faculty Survey (Appendix B) was to gather data about design college faculty perceptions about virtual world technology as a

teaching method in the classroom. The survey used in this study was primarily adapted from a 108-question survey developed by Pamela Stone Nicolle (2005), whose survey instrument (*The Process of Technology Adoption and Integration into Teaching and Learning by University Faculty*) was used in her dissertation on technology adoption by mainstream university faculty. As stated previously, Nicolle (2005) created her survey from 10 previously tested survey instruments, including the "Faculty Attitudes Toward Information" instrument and Jacobsen's (1998) dissertation survey instrument measuring technology innovativeness by university faculty. Nicolle also used tested survey items from a pilot study performed for her research. Nicolle granted permission to adapt her survey for the survey instrument used in this study (see Appendix D).

The development of the survey instrument (as well as the interview protocol used in this study) was based on the research questions posed for the study, the review of relevant literature, topics related to adoption of technology, and an existing tested survey instrument (the Nicolle, 2005, survey). Using tested surveys added to the reliability of the survey (Fowler, 2009). Additional questions in the survey instrument used for this research study (other than the questions adapted from the Nicolle, 2005, survey) were tested in a pilot study (see Appendix E) as well as synthesized from the literature reviewed. Justifications of each of the questions used in the Virtual Worlds Faculty Survey can be found in Appendix F.

The Virtual Worlds Faculty Survey was tested by a group of 12 design college faculty for readability, legibility, and usability. Pilot testing the survey instrument also assisted in checking for content, validity, wording of the questions, and length of the response to questions. The pilot test group took the survey in a computer lab and timed

how long it took to take the survey. Fowler (2009) suggests: “Probably the best way to pretest a self-administered questionnaire is in person, with a group of potential respondents” (p. 124).

After the testing of the survey instrument, a discussion was held with the pilot test group to ask questions about the survey instrument. The following items were addressed: 1) Were the instructions clear? 2) Were you able to understand the questions? 3) Did you have any problems in responding to the questions? 4) Was the survey instrument easy to use? 5) How long did it take you to complete the survey? Based on the response to the above questions, the consensus of the 12 pilot testers responded: 1) the instructions were clear; 2) the questions were easy to understand; 3) there were no problems in providing answers to any of the questions; 4) the survey instrument was easy to use; 5) it took an average of eight minutes to complete the online survey.

The Virtual Worlds Faculty Survey (see Appendix B) was the primary instrument involved in collecting faculty perceptions and beliefs about using virtual worlds technology in the classroom. The survey instrument used in this research study was a Web-based survey. The variables in my survey were gender, age group, race, social computing applications, subject taught, college location, years taught in higher education, and whether they teach online distance education classes. According to Cook, et. al. (2000), although paper-and-pencil surveys have been successful in the past for predicting high response rates, “respondents also find electronic surveys appealing. In a University of Colorado survey, for example, 55% of the respondents cited ease of use as one of the things they liked most about answering a Web-survey” (Cook, et. al., 2000, pp. 823-824). Sax, Gilmartin, and Bryant, (2003) state: “Web surveys also are convenient for

participants, since they usually can be completed at the respondent's leisure" (p. 410). The Virtual Worlds Faculty Survey was sent to all faculty in the 21 design colleges (2,273 faculty). Biweekly reminders (up until the cut-off date of July 31, 2010) were sent out to the potential faculty participants as a follow-up to encourage faculty who had not already taken the survey to participate in the research. According to Fowler (2009), "there is no agreed-upon minimum response-rate" (p. 510). Non-response rate is a concern, however, in any survey. Sax, et al. (2003) feel that "response rates are probably more dependent on the population sampled than on any other factor" (p. 41).

Item non-response is also a concern in all surveys (Fowler, 2009). In reference to non-response items, Fowler (2009) states: "There are two options: one can either leave those respondents who do not provide information out of the analysis, or one can try to estimate the answers they would have given if they provided answers" (p. 158). In all cases in the Virtual Worlds Faculty Survey, if a respondent skipped a question (thus not providing a response to an item), that respondent was left out of the analysis of that particular question.

The Virtual Worlds Faculty Survey informed the participants of the purpose of the study and the approximate time it took to complete the survey. The Virtual Worlds Faculty Survey (see Appendix B) consisted of 50 quantitative data-type questions. The Virtual Worlds Faculty Survey was a self-administered questionnaire via online and took approximately 10 minutes to complete.

The number of faculty (the faculty who teach at the targeted design colleges) that were recruited for the survey was 2,273. The Dean of Academic Affairs or the Faculty Development Director for each design college was contacted to email out the recruitment

letter to each faculty member at his or her college (see Appendix A). The faculty participants were contacted by email (via their Dean or Faculty Development Director), explaining the purpose of the survey and a link to the online survey. The email link in the recruitment email took the participant first to the Informed Consent page. The participant had to click on the "Agree" button on the online Informed Consent page prior to accessing the survey.

The data collection from the Virtual Worlds Faculty Survey was conducted through Survey Monkey. A professional Survey Monkey account was set up for this survey due to the number of questions asked in the survey and the number of responses anticipated. Survey Monkey was used as the survey instrument for this study due to the ease of creating questions with a variety of formats, such as Likert-type scale questions, multiple choice, multiple-response questions, and open-ended questions. Furthermore, the individual participant responses to the survey were anonymous due to the option of not tracking the IP address when the survey was designed. Another advantage of using Survey Monkey included a time and date cutoff for the survey, so that respondents could not complete the survey after the cutoff date of July 31, 2010. Desirable features of the Survey Monkey survey instrument included data collection methods, where the data showed the total response count and response percentages. The data could be saved in different file formats, such as HTML, PDF, and XML. Included with Survey Monkey was the option of allowing the researcher to export the data collected in the survey to an Excel format to use in Statistical Package for the Social Sciences (SPSS).

Interviews

At the end of the survey instrument, the respondents had the option of choosing to be interviewed about their perceptions regarding the use of virtual world technology in their courses. Post-survey semi-structured interviews of a random sample of purposefully selected survey participants were conducted via telephone (see Appendix G). Semi-structured post-survey interviews allowed for further exploration of "teachers' answers and gain additional insights" (Sugar, et al., 2004, p. 204), to give a thick description on faculty perceptions about potentially adopting virtual world technology.

A random purposeful sample (Onwuegbuzie & Leech, 2007) was used in this study to select the interview participants from the volunteers who provided an email address on the survey instrument, indicating that they were willing to be interviewed. The random purposeful sample was used due to the possibility that the number of respondents that agreed to participate in the interview could potentially be a large number. The advantage of using a random purposeful sample for the interviews included credibility, "when the purposeful sample is larger than one can handle" (Fridah, n.d.). Onwuegbuzie and Leech (2007) agree: "According to Miles and Huberman (1994), random purposeful sampling 'adds credibility to a sample when the potential purposeful sample is too large' (p. 113)." In addition, according to Onwuegbuzie and Leech (2007), random purposeful sampling involves the researcher choosing, "cases at random from the sampling frame consisting of a purposefully selected sample. That is, the researcher first obtains a list of individuals of interest for a study" (p. 113).

In the case of this research study, the participants had the option of submitting their email address for a potential post-survey interview. The participants for the post-

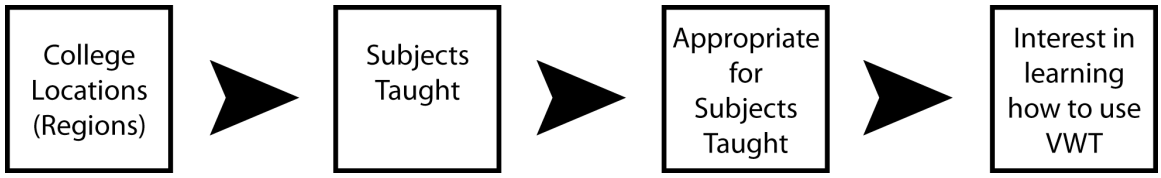
survey interviews were selected from the list of email addresses submitted in the Web-based survey. Twelve faculty were interviewed for the post-survey interviews for my study. The interviews took approximately 20 minutes each. The interviews were semi-structured, open-ended questions "intended to elicit views and opinions from the participants" (Creswell, 2009, p.181) about the use of virtual world technology in the classroom. The semi-structured interview questions on the follow-up interview consisted of three open-ended questions that specifically addressed the research questions posited for this study (see Appendix G). Once the interview participants were selected, the interviews were conducted over the telephone and audio recorded. The audio recordings were transcribed. The interview transcriptions were peer reviewed by another trained researcher (the secondary researcher) and sent via email to the interviewees for confirmation of accuracy in transcription (member-checking).

Interviewees' Case Selection

The final question on the Virtual Worlds Faculty Survey asked the participant whether they would agree to a brief post-survey interview. If the participant agreed to be interviewed, the participant provided an email address as contact information for a possible interview. After the survey data were analyzed, 151 participants agreed to a possible interview out of the 309 participants who completed the online survey. The 151 potential interviewees were narrowed down by random purposeful selection for potential interviewees. In order to provide a wide range of faculty opinions, distinguishing factors considered for the purposeful sample included: college location (region); subjects taught; either agreed, disagreed, or were neutral on whether virtual world technology was appropriate for the subject taught; and either agreed, disagreed, or were neutral on the

response on interest in learning how to incorporate virtual world technology into courses taught. Specifically, I printed out all of the 330 surveys but used only the 309 completed surveys to sort into groups. First, I divided the surveys up into regions of location, in order to perhaps provide representation from different parts of the country. Within the locations, I divided the surveys into subjects taught. Next, I sorted the surveys into either agreed, disagreed, or were neutral on whether virtual world technology was appropriate for the subject taught. Finally, I sorted by either agreed, disagreed, or were neutral on the response on interest in learning how to incorporate virtual world technology into courses taught. From the final group of surveys that met the above criteria, I randomly pulled 30 surveys to send an email request for a post-survey interview. An informed consent form was attached to the email request.

Figure 3. Selection criteria for the post-survey interviews.



Fifteen faculty, representing different regions of the country and different perceptions about virtual world technology, responded to the interview request, providing a telephone number and available times. Twelve of the fifteen interviewees were actually available for an interview. The final twelve interviewees were contacted by telephone, agreed to an audio recording of their interview, and were interviewed via telephone for approximately 20 minutes each. The random purposeful sampling resulted in faculty that represented a range of academic backgrounds and technology perspectives, comprising of seven males and five females, ages ranging from under 30 to over 59, and years of teaching from six to over 20 years. The subjects taught included Animation, Art

Foundations, Design Management, General Education, Graphic Design, Interior Design, and Video Production. College locations of the interviewees included California, Colorado, Georgia, Illinois, South Carolina, Texas, Virginia, and Washington. It is important to note that in choosing a random purposeful sample of potential interviewees, there was perhaps a chance that faculty who were not chosen to participate may have provided important insights into faculty perceptions on the research questions asked.

Conducting the Interviews

At the beginning of each interview, permission was confirmed by the interviewees to audio record the interview. Using the Post-Survey Interview Questions (Appendix G), the interview questions proceeded in sequential order, though allowing for any additional comments or feedback from the interviewees as needed. The in-depth responses from the interviewees were audio-recorded on a digital recorder, downloaded onto a secure computer, and manually transcribed into a word processor. The interview transcriptions were emailed out to the individual interviewees for member checking. After the member checking was completed and verified by the corresponding interviewees as accurate transcripts, the transcripts were cleaned up to eliminate the extraneous words (such as um, uh, ah, etc.).

The specific research questions asked in the post-survey semi-structured interviews were the guiding questions of this research study (see Appendix G): (1) Please explain your perception about using virtual world technology (such as *Second Life*) as a teaching tool in your course(s); (2) What do you see as the affordances of using virtual world technology in the higher education classroom?; and (3) What do you see as challenges of using virtual world technology in the higher education classroom?

Interviewee Participants

Twelve faculty were interviewed for this study. The interviewees represented different demographics and different backgrounds in higher education. Pseudonyms are used in place of actual names. Table 11 illustrates the demographics of the interviewee participants in this study.

Table 11
Demographics of Interviewees

Faculty 1: "Sondra"	Female, age 40 – 49, White, teaches Interior Design, college location is in Illinois, has taught 16 – 20 years, no online teaching, agrees that virtual world technology (VWT) is appropriate for subject taught, strongly agrees to learning how to incorporate VWT into courses.
Faculty 2: "Bradley"	Male, age 50 – 59, White, teaches General Education courses, college location is in California, has taught over 20 years, no online teaching, feels that VWT not appropriate for subject taught, neutral on learning how to incorporate VWT into courses.
Faculty 3: "Jerry"	Male, age Over 59, White, teaches General Education courses, college location is in Florida, has taught over 20 years, teaches online classes, agrees that virtual world technology (VWT) is appropriate for subject taught, strongly disagrees to learning how to incorporate VWT into courses.
Faculty 4: "Drew"	Male, age Under 30, White, teaches Art Foundations, college location is in Virginia, has taught 6 – 10 years, teaches online classes, agrees that VWT is appropriate for subject taught, agrees to learning how to incorporate VWT into courses.
Faculty 5: "Monte"	Male, age 30 – 39, White, teaches Animation courses, college location is in Washington, has taught 11 - 15 years, teaches online classes, agrees that VWT is appropriate for subject taught, agrees to learning how to incorporate VWT into courses.
Faculty 6: "Connie"	Female, age Over 59, White, teaches General Education courses, college location is in Georgia, has taught over 20 years, teaches online classes, neutral on VWT being appropriate for subject taught, neutral on learning how to incorporate VWT into courses.
Faculty 7: "Patrick"	Male, age Over 59, White, teaches Interactive Media Design courses, college location is in Texas, agrees that VWT is appropriate for subject taught, agrees to learning how to incorporate VWT into courses.
Faculty 8: "Bob"	Male, age Over 59, White, teaches Graphic Design courses, college location South Carolina, has taught over 20 years, no online teaching, agrees that VWT is appropriate for subject taught, neutral on learning how to incorporate VWT into courses.
Faculty 9: "Sean"	Male, age 40 – 49, White, teaches General Education courses, college location Washington, has taught 11 – 15 years, no online teaching, strongly agrees that VWT is appropriate for subject taught, strongly agrees to learning how to incorporate VWT into courses.
Faculty 10: "Sheryl"	Female, age 30 – 39, White, teaches Graphic Design courses, college location is in Florida, has taught 6 – 10 years, feels that VWT is not appropriate for subject taught, neutral on learning how to incorporate VWT into courses.
Faculty 11: "Cynthia"	Female, age 30 - 39, Black or African American, teaches Video Production courses, college location is in Georgia, has taught 6 – 10 years, no online teaching, neutral on VWT being appropriate for subject taught, neutral on learning how to incorporate VWT into courses.
Faculty 12: "Bev"	Female, age 40 – 49, White, teaches Design Management courses, college location is in Colorado, has taught 11 – 15 years, feels that VWT is not appropriate for subject taught, agrees to learning how to incorporate VWT into courses.

Data Analysis

In order to provide the best chance to answer the research question posed in this study, a mixed methods research approach was used (Johnson & Onwuegbuzie, 2004). Johnson and Onwuegbuzie (2004) define mixed methods research as "the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study" (p. 17). As part of the mixed methods approach, the quantitative data in the survey was analyzed using chi-square (x^2) goodness of fit test (for researcher-selected variables: AgeGroup, NCollegeLocation, NSubjectTaught, TeachOnline) and correlation coefficients (for the Likert-type scale questions) (Minium, Clarke, & Coladarci, 1998). The demographic responses and the Likert-type question responses to the survey were analyzed using SPSS.

All qualitative data in this study were analyzed using data coding to identify recurring patterns or themes as data were collected (Schram, 2006). The qualitative data collected in this study were through the post-survey semi-structured interviews from consenting faculty. The interview responses were analyzed by accurately transcribing the data looking for patterns and themes. A secondary researcher conducted a peer review to check the transcribed data for accuracy against the original interviews. As previously stated, the post-survey interviews were audio recorded, transcribed to a computer, organized for data analysis, and the data coded using a coding software application (Creswell, 2009). According to Rubin and Rubin (2005), after the interviews were transcribed, peer reviewed, and member-checked, concepts and themes needed to be examined. Once concepts and themes were identified and defined, codes or labels were

created. A code or a label was placed "next to each data unit where the matching concept, theme, event, or topical marker appears" (Rubin & Rubin, 2005, p. 219).

Analysis of interview transcripts

In applying the constructs of this study, the qualitative data were analyzed and coded to identify patterns and themes (the transcripts were coded for data reduction to facilitate the paring of data.) Coding assisted in identifying themes and patterns among the interview data gathered (Rubin & Rubin, 2005). Inductive coding was used in this study, which allowed me to develop the codes as I examined the interview data (Thomas, 2006). The interview data were coded using an open coding hybrid method (Rubin & Rubin). This method allowed for a constant comparative analysis (Rubin & Rubin). According to Rubin and Rubin (2005), the open coding hybrid method allows the researcher to,

> use an open coding framework without all the assumptions of grounded theory, coding as you go, rather than preparing a list, refining the concepts, and then marking them in the text. In this hybrid model, part-way between the responsive interviewing formal coding schema and grounded theory models, you need not code every passage or term but select only those concepts and themes that are most closely related to your research question. The more focused your interviews, the more efficient this hybrid is (p.223).

First, after the interview transcripts were transcribed into a word processor, I manually reviewed each interview to see if there were any overall common themes and patterns between the interviews. Next, the transcripts of the interviews were coded in NVivo 8 (a software program which assists in organizing qualitative data, such as interviews) to assist with the patterns or themes emerging from the interviews. As the coding evolved, themes and patterns emerged that were eventually used in the qualitative analysis. The constant comparative aspect of coding evolved as I reviewed the interviews.

After reviewing an interview and notating themes in NVivo, I compared the themes evolving to the previous interview. The following initial codes emerged from the interviews: accessibility, collaborative, content, creativity, engaging, faculty development, gaming, high learning curve, institution support, interactive, not appropriate, relate to technology, social aspects, time, and useful teaching tool. Table 12 reveals the codes generated from the interviews, how many times the specific code was stated in the interviews (Number of Occurrences) and how many of the faculty interviews (out of the 12) cited the theme within the interview (Number of Interviews Cited).

Table 12
Interview Coding Frequencies

Codes	Number of Occurrences	Number of Interviews Cited
Accessibility	18	8
Collaborative	12	5
Content	10	4
Creativity	2	2
Engaging	9	6
Faculty Development	8	4
Gaming	7	6
High Learning Curve	8	6
Institutional Support	8	5
Interactive	9	5
Not Appropriate	9	7
Relate to Technology	7	4
Social Aspects	8	4
Time	5	4
Useful Teaching Tool	17	10

Since the Creativity coding category revealed only two occurrences in two interviews, I decided to merge this code category into the Useful Teaching Tool category. Table 13 illustrates the final coding frequencies for the interviews.

Table 13
Interview Final Coding Frequencies

Codes	Number of Occurrences	Number of Interviews Cited
Accessibility	18	8
Collaborative	12	5
Content	10	4
Engaging	9	6
Faculty Development	8	4
Gaming	7	6
High Learning Curve	8	6
Institutional Support	8	5
Interactive	9	5
Not Appropriate	9	7
Relate to Technology	7	4
Social Aspects	8	4
Time	5	4
Useful Teaching Tool	17	10

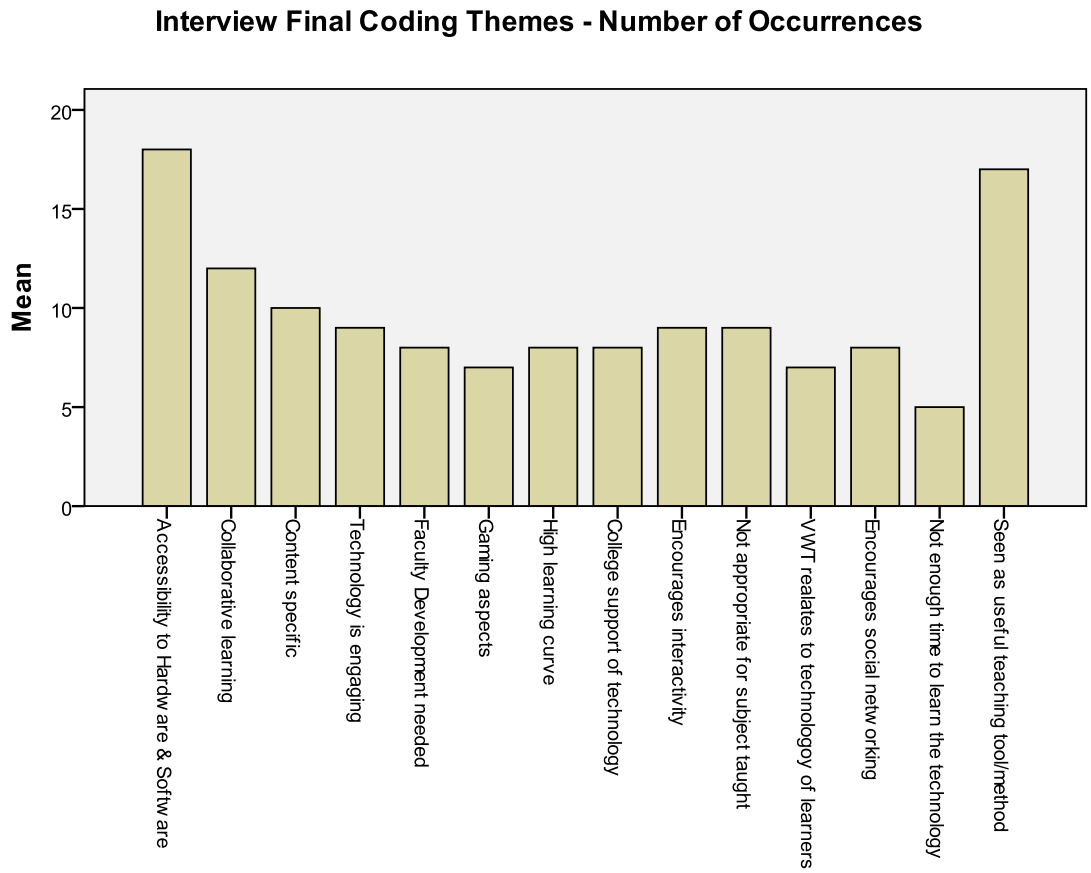
Grouping interview questions to coding themes

Table 14 illustrates how the interview coding themes relate to the interview questions. Some of the coding themes overlapped, since the responses applied to more than one question, depending on the context of the response. For example, the *Content* coding theme was seen in responses to both question two by one interviewee and question three by another interviewee.

Table 14
Interview Questions Related to Final Coding Themes

Interview Questions	Final Coding Themes
(1) What are your perceptions about virtual world technology that potentially affect the adoption into the classroom?	Collaborative Engaging Gaming Faculty Development High Learning Curve Not Appropriate Relate to Technology Social Aspect Useful Teaching Tool
(2) What are your perceptions of the affordances of using virtual world technology in the classroom?	Collaborative Engaging Content Relate to Technology Social Aspect Useful Teaching Tool
(3) What are your perceptions of the challenges of using virtual world technology in the classroom?	Accessibility Content Faculty Development Gaming High Learning Curve Institution Support Not Appropriate Time

Figure 4. Interview Final Coding Themes – Number of Occurrences



Limitations of the Methodology

The limitations of the methodology of this study included the impact of any bias associated with the study. These biases could include: selection bias, measurement bias and/or researcher bias. Likewise, sampling error should possibly be a consideration in the limitations of the methodology used in this study.

Selection Bias

Selection bias occurs when volunteers who participate in the study differ from those who represent the target population as a whole (Hartman, Forsen, Wallace, & Neely, 2002). For instance, faculty from one design college who participated in the study

may differ from the faculty in another design college (even though all of the colleges in the study are design colleges). The difference can occur either because of the region in which the colleges are located or by the subjects being taught by the faculty in the colleges. Hartman, et al. (2002) suggest the following to minimize selection bias: "Using strict eligibility, inclusion, and exclusion criteria and randomization for the allocation of maneuvers can minimize selection biases" (p. 28).

Non-respondent bias is a factor that is included under selection biases. Non-respondent bias transpires when those who choose not to participate or respond to the survey differ substantially from those who volunteered to participate (Hartman, et al., 2002). For example, faculty who decide to volunteer to participate in the survey and subsequent interviews about virtual world technology may have been more inclined or motivated to adopt new technologies in the classroom than those who chose not to participate. Since I had no control over responded to the survey, I was not able to control non-respondent bias in this study.

Measurement Bias

Measurement bias can occur through the instrument used in collecting the research data and/or through the researcher collecting the data (Hartman, et al., 2002). For example, if the primary instrument used to collect research data is a survey, how well the questions are designed to address the research questions are as important as "how well the answers to the questions collected in the survey" measure "what they are intended to measure" (Fowler, 2009, p. 12). Pilot testing the survey instrument assists in minimizing measurement errors (Fowler, 2009).

Additionally, since the faculty recruited for this survey may have potentially responded to the survey instrument from a bank of computers located in a faculty work area, the survey could not be limited to one response per IP address. Therefore, a limitation and measurement bias may be that one faculty member could potentially take the survey more than once.

Researcher Bias

I served as the primary researcher in this research study. As the department chair of a design college, I have experience in working with design college faculty and their challenges in the classroom in regards to technology. In my position as department chair, I manage approximately 40 higher education design college faculty. In addition, I regularly teach face-to-face undergraduate classes, have taught distance learning classes for six years, and understand the challenges and barriers faculty face in adopting and diffusing new technology into their teaching methods.

A limitation of the methodology used in this study included possible researcher bias. Biases included the assumption that design college faculty who teach technology-based courses possibly might be more receptive to using virtual world technology in the classroom. Another potential bias was the assumption that higher education faculty who teach courses using minimal technology in the classroom might not be as accepting of the usage of virtual worlds in the classroom. Finally, an assumption (which could be interpreted as researcher bias) was that faculty who volunteered to participate in the survey and subsequent interview for the study perhaps might have been more interested in virtual world technology than faculty who chose not to participate. In order to minimize researcher bias, a secondary researcher (another researcher who has had

training in research methods) assisted in collecting and analyzing the data in this study. In order to possibly minimize response bias, the faculty who teach in my department were not recruited to participate in this research study.

Minimizing Errors

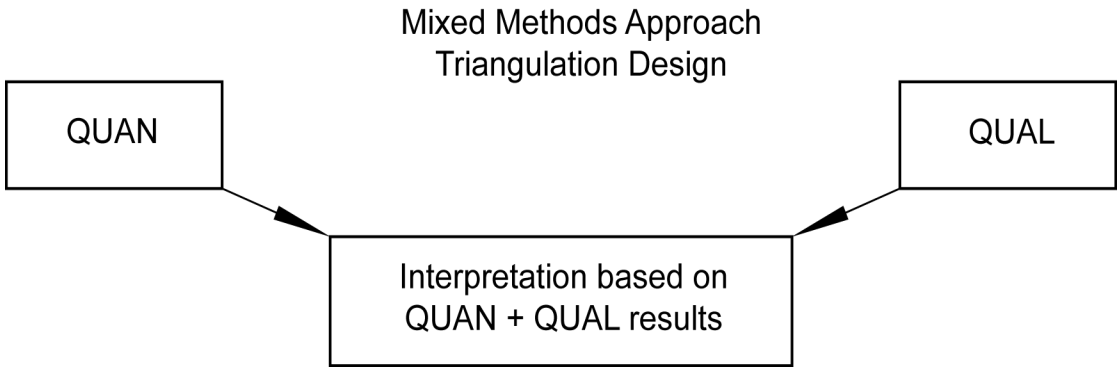
Since a survey was the primary data collection instrument used in this research study, minimizing survey errors was an important consideration when designing the survey. An important aspect of all survey design is to "minimize error in data collected by surveys and to measure the error that necessarily is part of any survey" (Fowler, 2009, p. 11). The Virtual Worlds Faculty Survey was based on an adaptation of Nicolle's (2005) "The Process of Technology Adoption and Integration into Teaching and Learning by University Faculty" published survey. Although Nicolle (2005) used 108 questions in her survey, the adaptation of her survey in this study focuses on questions that best address the research questions posed. Therefore, not all of the questions used in Nicolle's survey were adapted to the survey instrument used in this study. Thus, a possible limitation to this research possibly included the fact that not all of Nicolle's survey questions were in the adapted survey used for this study.

Furthermore, another limitation of this study possibly included that since the colleges used in this study are design colleges that incorporate and use many different instructional technology methods in the classroom (such as interactive media), the results of the research might not be generalizable to colleges that do not tend to incorporate many different methods of instructional technology (including interactive media).

Trustworthiness

Since several methods of data collection were used, the trustworthiness of the study should have been enhanced due to triangulating the data. Referring to Creswell and Plano Clark (2007), in using the mixed methods approach, the most commonly used method is the Triangulation Design approach (versus the Embedded Design, the Explanatory Design, or the Exploratory Design methods). Directly comparing qualitative and quantitative results is used in this method, with both qualitative and quantitative having equal weight (Creswell & Plano Clark, 2007). According to Creswell and Plano Clark, this research study would possibly fit into the Triangulation Design method since a quantitative survey as well as post-survey interviews were used to measure teacher perceptions about incorporating virtual world technology into their classes. The strength of the Triangulation Design method is "a one-phase design in which researchers implement the quantitative and qualitative methods during the same timeframe and with equal weights" (Creswell & Plano Clark, 2007, pp. 63-64).

Figure 5. The Triangulation Design (Creswell & Plano Clark, 2007, p. 65)



To enhance the trustworthiness of the research study, triangulation of the data appear to be one of the strengths of a mixed methods approach to research. In this research study, a combination of a survey (including demographic questions, Likert-type

questions, and open-ended questions) and random purposeful sampling post-survey interviews as data sources were used. In order to triangulate data for this research study, multiple sources, multiple methods of collecting data, and multiple researchers were utilized in analyzing the data (Creswell & Plano Clark, 2007). Higher education faculty from 21 design colleges in North America were recruited to participate in the study (multiple sources); a survey and post-survey interviews were conducted (multiple methods); and peer review of data collection by a secondary researcher (multiple researchers) as well as member-checking by the interviewees (to determine if the interview data were correctly transcribed) was performed to contribute to the trustworthiness of the study.

Reliability Analysis of the Survey

A reliability analysis was conducted on the survey for the Likert-type scale questions (Questions 9 - 49). Cronbach's Alpha coefficient was used to measure internal consistency reliability of the Likert-type scale questions in the survey. Table 15 illustrates that each survey item (Questions 9 - 49) registered at the 0.70 level (or greater than the 0.70 value), indicating acceptable internal consistency reliability (O'Sullivan, Rassel & Berner, 2003).

Table 15
Survey Items Internal Consistency Reliability (N=40)

Question	Cronbach's Alpha
Question 9	.774
Question 10	.775
Question 11	.790
Question 12	.775
Question 13	.789
Question 14	.794
Question 15	.800
Question 16	.786
Question 17	.789
Question 18	.797
Question 19	.801
Question 20	.777
Question 21	.774
Question 22	.772
Question 23	.773
Question 24	.782
Question 25	.772
Question 26	.802
Question 27	.780
Question 28	.773
Question 29	.777
Question 30	.779
Question 31	.774
Question 32	.774
Question 33	.767
Question 34	.768
Question 35	.771
Question 36	.793
Question 37	.789
Question 38	.770
Question 39	.766
Question 40	.769
Question 41	.770
Question 42	.768
Question 43	.779
Question 44	.769
Question 45	.780
Question 46	.812
Question 47	.791
Question 48	.796
Question 49	.769

Table 16 illustrates the overall average reliability statistics of the Likert-type scale items in the survey (Questions 9-49).

Table 16
Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.785	.813	40

The mixed methods research approach appears to bridge the gap between quantitative and qualitative methods allowing the researcher to choose the best of each in order to answer the research question(s) (Creswell & Plano Clark, 2007). In order to enhance trustworthiness of the research, several methods of data collection should be used. By using different data collection, the data can be triangulated. Agreeing with Johnson and Onwuegbuzie (2004), researchers should utilize the mixed methods approach to research in order to capture the strength of both quantitative and qualitative research methods.

A survey enables the researcher to obtain statistical data on attitudes of a certain population. The Virtual Worlds Faculty Survey employed a cross-sectional survey design, collecting the data at one point in time (Creswell, 2003). The Virtual Worlds Faculty Survey was administered online, which allowed the participants to self-administer the survey. The data collected were automatically stored in a database for retrieval. In addition, semi-structured post-survey interviews were conducted to reveal insights into the perceptions and epistemological beliefs of faculty members using virtual world technology in the classroom and their perceptions of incorporating this technology into their existing and future classes.

Summary

Johnson and Onwuegbuzie (2004) contend that mixed methods research can "bridge the schism between quantitative and qualitative research" (p. 15). Creswell and Plano Clark (2007) assert, "the combination of qualitative and quantitative data provides a more complete picture by noting trends and generalizations as well as in-depth knowledge of participants' perspectives" (p. 33). By using quantitative data (such as data collected in a survey) combined with qualitative data (such as interviews), the mixed methods approach to research is an effective mechanism for answering the research question posed. The Virtual Worlds Faculty Survey, which is one of the instruments used in this research study used to collect data, reflected on issues that are relevant to education today, such as faculty who are digital-immigrants being able to embrace new technology and their perceptions and beliefs about the affordances and barriers of using new technologies. By examining different epistemological beliefs (Johnson & Onwuegbuzie, 2004) and beliefs about reality and knowledge construction (Wang & Gloviczki, 2008) which are related to the use of virtual world technology, interviews of faculty who participated in this study provided a thick description of faculty perceptions to enhance the quantitative data collected in the survey instrument.

Mixed methods research requires the investigator to use multiple sources and methods of data collection in order to contextualize the data (Creswell & Plano Clark, 2007). The mixed methods approach used in this study appeared to be the best method to answer the research question posed by this study by focusing on what can be learned about faculty and their perceptions of incorporating virtual world technology into the classroom. Triangulating the survey and interview data collected in this research study

assisted in enhancing the validity of the data collected thus possibly enhanced the trustworthiness of the study.

CHAPTER 4

RESULTS

This mixed methods study was designed to explore design college faculty perceptions of the adoption of virtual world technology into the classroom. Data were collected through an online survey and post-survey semi-structured interviews from faculty teaching in twenty design colleges across the United States and one design college in Canada. The quantitative survey instrument included questions about the usage of technology, including virtual world technology, in the higher education classroom. Post-survey semi-structured interviews were conducted with 12 faculty who volunteered for an interview after participating in the online survey. The specific research question posed in this study was: What are the perceptions of design college faculty regarding the use of virtual world technology in their courses? Guiding questions included: (a) What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? (b) What are faculty perceptions of the affordances of using virtual world technology in the classroom? (c) What are faculty perceptions of the challenges of using virtual world technology in the classroom?

The results of this study are reported in this chapter. Subsections of this results chapter include: (1) analysis of the quantitative survey data; (2) test of goodness of fit analysis; (3) correlation coefficient analysis; (4) interview data analysis; and (5) summary of results.

Survey Response

To recruit faculty volunteers for the Virtual World Faculty Survey, the Faculty Development Directors or the Deans of Academic Affairs of 43 design colleges were sent an email request to forward on to the faculty in their respective colleges. Twenty-one out of the 43 colleges sent out the Virtual Worlds Faculty Survey request to their faculty representing 49% of the design colleges targeted for the survey. The number of design college faculty who were sent the recruitment email to participate in the Virtual Worlds Faculty Survey was a total of 2,273. The total number of participants who participated in the Virtual Worlds Faculty Survey was 330. The survey return rate was 14.52%. Three hundred thirty faculty (out of 2,273 recruited) responded to the Virtual Worlds Faculty Survey used in this study for a survey return rate of 14.52%. However, 21 respondents did not complete the survey, resulting in a completed survey response rate of 13.6%. Thus, at a 95% confidence level, the corresponding confidence interval was ± 2.63%, with a range for the true population proportion falling into the range from 91.01% to 96.27%.

Descriptive Statistics of the Survey Data (other than Demographic Data)

The Virtual Worlds Faculty Survey (Appendix B) involved Likert-type scale questions for Questions 9 – 49. The responses were listed as Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree. To analyze the results of the survey items, a numeric value was assigned to each response and the values can be summed to obtain a single numeric value for each question. Normally, Likert-type scaling methods (as used in this survey) signify an ordinal level of measurement where responses are ranked in order from less to more (Berner, O'Sullivan, & Rassel, 2003). All questions were positively

scaled questions, even though several questions (Questions 13, 15, 16, 17, 18, 19, 26, 36, 46, 47, and 48) were negative statements (versus positive statements). Table 17 illustrates the descriptive statistics of the Likert-type scale Questions 9 – 49.

Table 17
Means and Standard Deviation Table of Likert Scale Questions 9 – 49

		M	SD
9.	Technology integration into teaching and learning is very important for my students.	4.22	.905
10.	Effective technology integration can be a positive change agent in student learning within my discipline.	4.29	.778
11.	My teaching philosophy reflects that students learn most effectively through teacher-student interaction.	4.34	.818
12.	My teaching philosophy reflects that students learn most effectively when provided opportunities to interact with content and construct their own learning.	3.93	.946
13.	I do not have enough personal technology skills to integrate virtual world technology into teaching.	1.84	.933
14.	Technology integration into teaching and learning requires too much of my class preparation time.	2.45	.982
15.	I do not tend to adopt new technologies as they are introduced.	2.26	1.116
16.	My college does not provide enough professional development opportunities that target the use of technology in instruction.	2.88	1.175
17.	There is little or no administrative support for the integration of technology into teaching and learning.	2.61	1.113
18.	I do not know how I would incorporate virtual world technology in my course(s).	3.14	1.217
19.	I feel that my teaching methods do not need to change to adapt to new technologies.	2.31	.961
20.	I see technology in teaching as a welcome challenge.	3.99	.783
21.	Technology integration benefits my students.	4.11	.699
22.	When I learn new technology skills and strategies, I have more confidence in my teaching.	3.83	.890
23.	Through my past and present use of technological tools, I am better able to tailor students' work to their individual needs.	3.69	.914
24.	Through the use of technological tools, I may spend more time preparing materials and resources for instruction.	3.65	.921
25.	Through the use of technological tools, my students can work in an environment, which appeals to a variety of learning styles.	3.85	.823
26.	I have no goals for integrating technology in my teaching.	1.98	.837
27.	Institution-provided / funded workshops / seminars are very important to me as a source of information concerning integrating technology in my teaching.	3.87	.960
28.	I would like to participate more in technical or technology integration faculty development opportunities.	3.99	.838
29.	An informal network of friends/colleagues is very important to me as a source of information concerning integrating technology in my teaching.	3.93	.831
30.	If additional incentives were offered, I would more likely participate in technology integration faculty development opportunities.	3.94	.923

Table 17 cont'd.			
31.	Using technology in teaching and learning has caused me to change my teaching style.	3.38	.909
32.	I use multimedia technology tools (e.g. audio, video, image editing) when preparing my course(s).	3.90	1.060
33.	Technology use in my classroom encourages more student-centered learning.	3.66	.934
34.	Using virtual world technology in my course(s) will engage my students in the learning.	3.29	.902
35.	Using a virtual world assignment in my course(s) (either as an in-class activity or as a homework assignment) would engage my students in learning.	3.37	.936
36.	I do not have the time to learn how to incorporate virtual world technology in my course(s).	2.68	1.020
37.	In a virtual world educational environment, students can learn by constructing their own knowledge as they explore the virtual world (as in constructivist learning).	3.41	.824
38.	Using virtual world technology in my course(s) will help increase collaborative learning.	3.30	.884
39.	Using virtual world technology in my course(s) encourages more student-centered learning.	3.33	.883
40.	Using virtual world technology in my course(s) as a teaching tool can promote an environment for the students where they discover knowledge as they experience and participate in activities (discovery learning).	3.51	.864
41.	I believe that students respond positively to an interactive learning environment, such as virtual worlds.	3.57	.849
42.	I believe that virtual world technology provides an immersive learning environment where the student can become engaged in the learning as they explore the virtual environment.	3.50	.860
43.	I believe if the students are immersed in the learning process they will achieve higher intrinsic rewards, thus greater self confidence (or self-efficacy).	3.99	.870
44.	I believe there are advantages to using virtual world technology in my course(s).	3.44	.922
45.	My students' attitude towards technology has an effect on my attitude towards technology.	3.46	1.087
46.	Using virtual world technology in my course(s) is not appropriate for the subject(s) I teach.	2.84	1.061
47.	I cannot depend on access to essential software (such as *Second Life* or other virtual environment software) in order to use virtual world technology in my course(s).	3.26	1.001
48.	I cannot depend on access to essential hardware (such as a computer or Internet connection) in order to use virtual world technology in my course(s).	2.80	1.116
49.	I am interested in learning how to incorporate virtual world technology into my course(s).	3.60	.999

The survey participants were asked questions about technology in general as well as virtual world technology specifically. General technology questions were included in the survey with the thinking that the faculty could be receptive to technology in general, but not to virtual world technology. The questions that were specifically related to virtual world technology were Questions 13, 18, 34 – 44, and 46 – 49.

The final question on the Virtual Worlds Faculty Survey (Question 50) asked, "Would you consider being interviewed for a brief follow-up interview for this survey?" The participant chose either: Yes or No. If the participant chose "Yes" to Question 50, the participant had the option to provide an email address in an open-text box. Table 18 indicates the results of the post-survey interview question.

Table 18
*Frequency Table – Agree to Post-Survey Interview**

Agree to Post-Survey Interview	Frequency	Response Percentage
Yes	151	51.0%
No	145	49.0%

* Twenty-four respondents skipped the question

Quantitative Research Questions Analysis

The standard deviation scores on the survey responses appear high, in general (a range of .699 through 1.217). Possibly the reason the standard deviation scores are high is due to the Likert 5-point scale used in the survey. The Likert-type scale used was a five-point scale, which means the distribution of answers is discrete, allowing only five possibilities. The high standard deviation means that the data is spread out over the five possible answers. The five-point Likert-type scale was chosen because I felt the participants might be more responsive and complete the survey by using the five-point scale rather than a nine-point scale, for example. In examining the survey data in the

Virtual Worlds faculty Survey, the data indicate the following responses (out of a total of 15,006 responses for Questions 9 – 49):

(1) Strongly Disagree: 1135 for 7.56% of the total responses

(2) Disagree: 2412 for 16.07% of the total responses

(3) Neutral: 3770 for 25.12% of the total responses

(4) Agree: 4987 for 33.23% of the total responses

(5) Strongly Agree: 2702 for 18% of the total responses

The above response distribution indicates a spread of responses over the Likert five-point scale used, contributing to a high standard deviation.

Guiding question one: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom?

In relationship to the research questions for this study, this analysis revealed between "Neutral" and "Agree" on the Likert-type scale on the faculty perceptions of virtual world technology that potentially affect the adoption into the classroom. Table 19 illustrates the faculty perceptions of affordances, where there is "Neutral" to "Agree" on the question.

Table 19
Frequency Table – Faculty Perceptions of Virtual World Technology in the Classroom

		M	SD
Q 34	Using virtual world technology in my course(s) will engage my students in the learning.	3.29	.902
Q 35	Using a virtual world assignment in my course(s) (either as an in-class activity or as a homework assignment) would engage my students in learning	3.37	.936

Yet, the response to, "I do not tend to adopt new technologies as they are introduced" (Question 15), revealed between a Strongly Disagree and Disagree with $M = 2.26$,

SD = 1.116, indicating that the faculty participating in this survey perhaps feel that they adopt new technologies (such as virtual worlds) as they are introduced.

Guiding question two: What are faculty perceptions of the affordances of using virtual world technology in the classroom?

In reference to faculty perceptions of the affordances of virtual world technology in the classroom, this analysis also revealed between "Neutral" and "Agree" on the questions that addressed perceived affordances. Table 20 illustrates the faculty perceptions of affordances, where there is "Neutral" to "Agree" on the question.

Table 20
Frequency Table – Faculty Perceptions of Affordances

		M	SD
Q 37	In a virtual world educational environment, students can learn by constructing their own knowledge as they explore the virtual world (as in constructivist learning).	3.41	.824
Q 38	Using virtual world technology in my course(s) will help increase collaborative learning.	3.30	.884
Q 39	Using virtual world technology in my course(s) encourages more student-centered learning.	3.33	.883
Q 40	Using virtual world technology in my course(s) as a teaching tool can promote an environment for the students where they discover knowledge as they experience and participate in activities (discovery learning).	3.51	.864
Q 41	I believe that students respond positively to an interactive learning environment, such as virtual worlds.	3.57	.849
Q 42	I believe that virtual world technology provides an immersive learning environment where the student can become engaged in the learning as they explore the virtual environment.	3.50	.860
Q 43	I believe if the students are immersed in the learning process they will achieve higher intrinsic rewards, thus greater self confidence (or self-efficacy).	3.99	.870
Q 44	I believe there are advantages to using virtual world technology in my course(s).	3.44	.922

Even though Question 43 does not specifically state the words "virtual world technology" in the sentence, the previous question (Question 42) specifically states that virtual world technology provides an immersive learning environment (and the

respondents indicated a level of agreement with this statement), thus virtual world technology can be inferred as an immersive learning environment in relation to Question 43.

Guiding question three: What are faculty perceptions of the challenges of using virtual world technology in the classroom?

In relation to faculty perceptions of the challenges of using virtual world technology in the classroom, the indicators resulted in "Neutral" to "Agree" to Questions 18 and 47. Table 21 illustrates the faculty perceptions of challenges where there is a "Neutral" to "Agree" on the question.

Table 21
Frequency Table – Faculty Perceptions of Challenges - Agreement

		M	SD
Q 18	I do not know how I would incorporate virtual world technology in my course(s).	3.14	1.217
Q 47	I cannot depend on access to essential software (such as *Second Life* or other virtual environment software) in order to use virtual world technology in my course(s).	3.26	1.001

Conversely, on other statements that could be perceived as a challenge to faculty using virtual world technology in the classroom, the indicators yielded between "Strongly Disagree" and "Disagree." Table 22 illustrates questions that indicate a level of disagreement.

Table 22
Frequency Table – Faculty Perceptions of Challenges - Disagreement

		M	SD
Q 13	I do not have enough personal technology skills to integrate virtual world technology into teaching.	1.84	.933
Q 36	I do not have the time to learn how to incorporate virtual world technology in my course(s).	2.68	1.020
Q 46	Using virtual world technology in my course(s) is not appropriate for the subject(s) I teach.	2.84	1.061
Q 48	I cannot depend on access to essential hardware (such as a computer or Internet connection) in order to use virtual world technology in my course(s).	2.80	1.116

The Virtual Worlds Faculty Survey also revealed information on faculty development opportunities in relation to training in virtual world technology. Table 23 illustrates questions that indicate a level of agreement in regards to perceptions on faculty development opportunities.

Table 23
Frequency Table – Faculty Development Opportunities

		M	SD
Q 18	I do not know how I would incorporate virtual world technology in my course(s).	3.14	1.217
Q 28	I would like to participate more in technical or technology integration faculty development opportunities	3.99	.838
Q 30	If additional incentives were offered, I would more likely participate in technology integration faculty development opportunities.	3.94	.923
Q 49	I am interested in learning how to incorporate virtual world technology into my course(s).	3.60	.999
Q 48	I cannot depend on access to essential hardware (such as a computer or Internet connection) in order to use virtual world technology in my course(s).	2.80	1.116

Test of Goodness of Fit

In order to determine if there was a significant difference between observed and expected value of the selected variables in the Virtual Worlds Faculty Survey, a one-sample chi-square goodness of fit test was used. According to Minium, et al, (1999), a chi-square test is used as a statistical test of frequency data because: "the magnitude of χ^2

reflects the amount of discrepancy between observed and expected frequencies and, therefore, the tenability of [null hypothesis] H_0" (p. 383). The one-sample test of goodness of fit (χ^2) specifies what percentage of the deviation from the expected data were obtained in the analysis (Huck, 2008). Huck (2008) states that since,

> the one-sample chi-square test compares the observed sample percentages with the corresponding set of population percentages specified in H_0, this kind of chi-square analysis is often referred to as a goodness-of-fit-test. If these two sets of percentages differ by an amount that can be attributable to sampling error, then there is said to be a good fit between the observed data and what would be expected if the H_0 were true. In this situation, the H_0 is retained. On the other hand, if sampling error cannot adequately explain the discrepancies between the observed and null percentages, then a bad fit is said to exist and the H_0 is rejected (p. 452).

Variables used to compare observed versus expected values

In order to determine if there was a correspondence between observed and expected data, specific variables were chosen to test for chi-square goodness of fit based on researcher-selected indicators that could potentially affect the individual responses to the questions of the survey. These were: AgeGroups, NSubjectTaught, NCollegeLocation, YearsTaught, and TeachOnline.

For the goodness of fit test, the null hypothesis (H_0) stated that the observed values between the designated variables (listed above) fit the expected values (for a "good fit"), meaning that the observed data do not differ significantly from the expected values. The alternative hypothesis (H_A) for this study stated that the observed values of the designated variables do not fit the expected values (or differed from the expected values). In order to accept the H_0 as true with p-value >.05, the significance level (Asymp. Sig.) must equal .05. If the p-value is less than .05, the H_0 is rejected. Table 24

illustrates the chi-square test for the variables AgeGroups, YearsTaught, NSubjectTaught, NCollegeLocation, and TeachOnline.

Table 24
Chi-Square Test – Variables AgeGroup, , NCollegeLocation, NSubjectTaught, YearsTaught, TeachOnline

Variable	Chi-Square	*df*	Asymp. Sig.
AgeGroup	77.34	4	.000
NCollegeLocation	326.76	4	.000
NSubjectTaught	107.54	5	.000
YearsTaught	94.921	4	.000
TeachOnline	88.87	1	.000

In comparing the expected and observed frequencies of AgeGroups, YearsTaught, NSubjectTaught, NCollegeLocation, and TeachOnline, the test for goodness of fit for AgeGroup, YearsTaught, and NCollegeLocation, with the degrees of freedom (*df*) equaling 4 at the p-value >.05, the critical value is 9.488. For NSubjectTaught, with the degrees of freedom (*df*) equaling 5, at the p-value >.05, the critical value is 11.071. For TeachOnline, with the degrees of freedom (*df*) equaling 1 at the p-value >.05, the critical value is 3.841. The test for goodness of fit for the AgeGroup, NCollegeLocation, NSubjectTaught, YearsTaught, and TeachOnline indicates no correlation between the observed and expected data, thus rejecting the H_0.

The chi-square goodness of fit test was used in this study to determine if the selected variables fit what is expected within all populations. For example, in the Age Group category, I expected to have an equal proportion of age groups 30 - 39 and age groups 40 – 49. However, since I did not have control of who participated in my survey, my observed results may have been twice as many age 30 -39 respondents as 40-49 respondents, so they could not fit the expected values. According to Bluman (2005), in a

goodness of fit test, the observed value almost always differs from the expected in the population, discerning if this result is from chance or not. The p-value indicates that the observed values in this survey are not random. Since respondents were volunteers, certain types of people were more likely to respond. The goodness of fit test was used as a type of baseline in this study to determine if the selected variables fit the expected values in the sample.

Correlation Analysis

In this study, the variables (AgeGroups, NSubjectTaught, NCollegeLocation, YearsTaught, and TeachOnline) were measured for association against the responses for Questions 9 – 49 to determine if there was a relationship between those variables and the responses. The possibility of whether the age of the faculty (AgeGroup) responding to the survey had an effect in the survey response given was explored; whether the subject that the faculty taught (NSubjectTaught) had any effect on the given responses; whether the location of the design college (NCollegeLocation) where the faculty taught had an effect on the given responses; whether the number of years (YearsTaught) that the faculty taught in higher education had an effect on the given responses; whether the faculty currently teaches or had ever taught online distance classes (TeachOnline) to observe if there was an effect on the given responses.

Since Questions 9 – 49 were Likert-type scale questions (and therefore considered ordinal scaled values), the Spearman rho correlation coefficient measure of association was used in this study (Rodeghier, 1996). The Spearman rank correlation is a nonparametric alternative to the Pearson correlation coefficient, which is commonly used to measure associations of interval or ratio data (Rodeghier, 1996). In order to determine

if there is an association between the selected variables (AgeGroups, NSubjectTaught, NCollegeLocation, YearsTaught, and TeachOnline) and Questions 9 – 49, the Spearman rank correlation uses values between +1.00 and -1.00, in the same way the Pearson correlation does (Minium, et al, 1999). According to Minium, et al. (1999),

> when the rank of *X* is identical to the rank of *Y* for each individual there is a perfect positive relationship between the two sets of ranks and r_{ranks}= +1.00. Conversely, r_{ranks}= -1.00 when there is a perfect inverse (Negative) relationship between ranks. (p. 418)

The H_0 (the null hypothesis) stated that there was no association between the selected variables (AgeGroups, NSubjectTaught, NCollegeLocation, YearsTaught, and TeachOnline) and the responses to Questions 9 - 49. The H_A (the alternative hypothesis) for this study stated that there was an association (either positively or negatively) between the selected variables (AgeGroups, NSubjectTaught, NCollegeLocation, YearsTaught, and TeachOnline) and the responses to Questions 9 - 49. The Spearman's rho correlation between the variables and Questions 9 – 49 demonstrated whether there was a degree of association at the 0.01 or 0.05 level (1-tailed). According to O'Sullivan, Rassel, and Berner (2003), even though discrepancies exist between opinions on what constitutes a sufficiently large *r*-value, in general, "values of *r* between .40 and .60 seem quite strong" (p. 432). Tables 25 - 29 illustrate the Spearman rank correlation measure of association for the demographic variables in relationship to Questions 9 – 49.

Table 25
Correlation – AgeGroups to Questions 9 - 49

Question	Spearman Rank Correlation	Sig. (1-tailed)	N
9	-.160**	.003	307
10	-.210**	.000	306
11	.028	.312	306
12	-.118*	.020	307
13	.228**	.000	305
14	.203**	.000	306
15	.141*	.007	305
16	.042	.233	304
17	.043	.229	305
18	.024	.337	306
19	.090	.059	307
20	-.226**	.000	306
21	-.162**	.002	305
22	-.214**	.000	306
23	-.114*	.024	303
24	.014	.406	306
25	-.120	.018	305
26	.213**	.000	303
27	-.046	.214	303
28	-.152**	.004	305
29	-.170**	.001	305
30	-.149**	.005	304
31	-.073	.101	304
32	-.328**	.000	306
33	-.177**	.001	305
34	-.065	.130	302
35	-.061	.145	301
36	.150**	.005	301
37	-.135*	.010	302
38	-.151**	.004	301
39	-.068	.120	300
40	-.106*	.034	298
41	-.051	.187	303
42	-.043	.227	302
43	-.051	.186	303
44	-.069	.117	301
45	-.056	.165	304
46	.060	.147	303
47	-.020	.365	301
48	.054	.175	301
49	-.149**	.005	300

* *Correlation is significant at the 0.05 level (1-tailed).*
** *Correlation is significant at the 0.01 level (1-tailed).*

Table 26
Correlation – NSubjectTaught to Questions 9 - 49

Question	Spearman Rank Correlation	Sig. (1-tailed)	N
9	-.243**	.000	308
10	-.162**	.002	307
11	.002	.488	307
12	.016	.389	308
13	.305**	.000	306
14	.088	.063	307
15	.227**	.000	306
16	-.048	.202	305
17	.041	.237	306
18	.085	.068	307
19	.084	.072	308
20	-.172**	.001	307
21	-.163**	.002	306
22	-.173**	.001	307
23	-.207**	.000	305
24	-.089	.060	307
25	-.085	.068	306
26	.164**	.002	304
27	.011	.427	304
28	-.032	.290	306
29	-.117*	.020	306
30	-.119*	.019	305
31	.049	.199	305
32	-.249**	.000	307
33	-.172**	.001	306
34	-.068	.120	303
35	-.051	.190	302
36	.073	.102	302
37	-.014	.403	303
38	-.059	.154	302
39	-.028	.312	302
40	-.048	.204	299
41	-.012	.415	305
42	-.033	.283	303
43	.023	.344	305
44	-.050	.194	302
45	.088	.062	305
46	-.008	.443	304
47	-.136*	.009	302
48	.044	.222	302
49	-.084	.072	301

* *Correlation is significant at the 0.05 level (1-tailed).*
** *Correlation is significant at the 0.01 level (1-tailed).*

Table 27
Correlation – NCollegeLocation to Questions 9 - 49

Question	Spearman Rank Correlation	Sig. (1-tailed)	N
9	.011	.427	297
10	-.012	.416	296
11	.002	.483	296
12	.005	.463	297
13	.014	.406	296
14	.109*	.031	296
15	.021	.360	295
16	.111*	.029	294
17	.099	.045	295
18	-.022	.350	296
19	-.018	.378	297
20	.036	.271	296
21	.037	.263	295
22	-.058	.162	296
23	-.051	.194	293
24	-.005	.463	296
25	-.073	.107	295
26	.068	.124	293
27	-.146*	.006	293
28	.005	.465	295
29	-.104*	.037	295
30	.077	.095	294
31	-.010	.431	294
32	.042	.236	296
33	-.083	.078	295
34	-.048	.209	293
35	.007	.455	292
36	.154**	.004	291
37	-.053	.181	292
38	-.104*	.038	291
39	-.054	.179	290
40	-.011	.426	288
41	-.071	.113	293
42	-.042	.236	292
43	-.071	.112	293
44	-.041	.245	291
45	.036	.267	294
46	.003	.478	293
47	.059	.156	291
48	-.038	.260	292
49	.012	.422	290

* *Correlation is significant at the 0.05 level (1-tailed).*
** *Correlation is significant at the 0.01 level (1-tailed).*

Table 28
Correlation – YearsTaught to Questions 9-49

Question	Spearman Rank Correlation	Sig. (1-tailed)	N
9	-.112*	.024	309
10	-.158**	.003	308
11	.101*	.039	308
12	-.081	.078	309
13	.022	.348	307
14	.172**	.001	308
15	.086	.066	307
16	.107*	.031	306
17	.079	.083	307
18	.074	.099	308
19	.034	.278	309
20	-.190**	.000	308
21	-.158**	.003	307
22	-.126*	.013	308
23	-.024	.341	305
24	.145*	.005	308
25	-.031	.295	307
26	.141*	.007	305
27	-.044	.224	305
28	-.128*	.012	307
29	-.066	.125	307
30	-.052	.185	306
31	.015	.394	306
32	-.132*	.010	308
33	-.065	.129	307
34	-.052	.182	304
35	-.071	.110	303
36	.073	.103	303
37	-.117*	.021	304
38	-.100*	.041	303
39	-.041	.238	302
40	-.042	.235	300
41	-.050	.194	305
42	-.047	.207	304
43	-.105*	.033	305
44	-.056	.168	303
45	.028	.314	306
46	.018	.377	305
47	.079	.084	303
48	.091	.057	303
49	-.081	.080	302

* *Correlation is significant at the 0.05 level (1-tailed).*
** *Correlation is significant at the 0.01 level (1-tailed).*

Table 29
Correlation – TeachOnline to Questions 9-49

Question	Spearman Rank Correlation	Sig. (1-tailed)	N
9	-.039	.247	309
10	-.077	.090	308
11	-.026	.326	308
12	-.108*	.029	309
13	.207**	.000	307
14	-.017	.381	308
15	.201**	.000	307
16	-.054	.173	306
17	-.103*	.036	307
18	.207**	.000	308
19	.100*	.039	309
20	-.179**	.001	308
21	-.110*	.027	307
22	-.086	.067	308
23	-.178**	.001	305
24	-.132*	.010	308
25	-.158**	.003	307
26	.156**	.003	305
27	.046	.211	305
28	-.003	.478	307
29	-.064	.133	307
30	-.079	.083	306
31	-.139*	.007	306
32	-.085	.067	308
33	-.106*	.031	307
34	-.104*	.035	304
35	-.121*	.018	303
36	.118*	.020	303
37	-.155**	.003	304
38	-.151**	.004	303
39	-.096	.048	302
40	-.063	.138	300
41	-.055	.169	305
42	-.117*	.021	304
43	.016	.391	305
44	-.157**	.003	303
45	.031	.294	306
46	.146**	.005	305
47	.010	.431	303
48	.027	.320	303
49	-.040	.242	302

* *Correlation is significant at the 0.05 level (1-tailed).*
** *Correlation is significant at the 0.01 level (1-tailed).*

For the Spearman rank correlation for the demographic variables (AgeGroups, NSubjectTaught, NCollegeLocation, YearsTaught, and TeachOnline), there were either no associations or very weak associations. The strongest correlations were seen between the AgeGroup variable to Question 32: "I use multimedia technology tools (e.g. audio, video, image editing) when preparing my course(s) at -.328 *r*-value (a negative correlation) and between the NSubjectTaught variable and Question 13: "I do not have enough personal technology skills to integrate virtual world technology into teaching," at .305 *r*-value. Both of these correlations are considered weak.

Interview Data Analysis

In order to gain additional insights and to perhaps provide a thick description on faculty perceptions about potentially adopting virtual world technology, post-survey semi-structured interviews were conducted with 12 faculty who volunteered to be interviewed after participating in the online survey. Inductive coding was used in this study, which allowed me to develop the codes as I examined the interview data (Thomas, 2006). The interview data were coded using an open coding hybrid method (Rubin & Rubin, 2005). This method allowed for a constant comparative analysis (Rubin & Rubin).

The excerpts from the interview transcripts provide an illustration of the themes that emerged in the post-survey interviews. There were themes that overlapped during the interviews as evident in the following excerpts:

Accessibility to Appropriate Hardware and Software Theme

The theme of accessibility to the proper hardware and software in order to use virtual world technology in the classroom occurred throughout the interviews in response to Question 3: What are your perceptions of the challenges of using virtual world

technology in the classroom? The themes generated within the accessibility theme centered on the perception of the interviewees about limited access to the technology needed to use virtual world technology in the classroom.

The following are excerpts from the faculty interview transcripts, which relate to the *accessibility* theme:

> *Sondra stated:* Challenges would be to get technology to buy into using this platform, since it is also associated with gaming or a feeling of waste of time, or will attract people that are up to no good.
>
> *Bradley stated:* The technology is not readily available to us.
>
> *Monte stated:* I was frustrated that my school would not allow us to work with *Second Life* back when I was starting research for my doctorate. I can only assume this will continue to be an issue for institutions that have tight control from IT departments. I understand the network issues that make it difficult to have a lot of users on *Second Life* at the same time and this may be a deterrent for more than a few campuses.
>
> *Bob stated:* Availability of the interface to all potential participants.
>
> *Sean stated:* Accessibility is the biggest challenge. The equipment, Internet access – those particular issues as well as connectivity issues within the existing frameworks and software that are there.
>
> *Sheryl stated:* The inability to mandate its use for students who do not have a personal computer is probably the biggest obstacle in using virtual world technology as a supplemental tool to classroom instruction. Additionally, the acquisition and implementation of this technology – though free in most instances – is problematic when trying to run on certain networked computer banks and interfaces.
>
> *Cynthia stated:* Some students do not have a computer at home, so I think accessibility to the technology might be problematic.

> *Bev stated:* In the classroom, perhaps bandwidth might be an issue if the virtual world technology takes up too much bandwidth, especially with a 24-seat computer lab.

Collaborative Learning Theme

The theme of collaborative learning occurred throughout the interviews in response to Question 1: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? and Question 2: What are faculty perceptions of the affordances of using virtual world technology in the classroom? The patterns within the *collaborative learning* theme centered on the use virtual world technology in the classroom as a tool to encourage collaboration between students in the class.

The following are excerpts from the faculty interview transcripts, which relate to the *collaborative* theme:

> *Drew stated:* Specifically, I have been looking into ways to create a more collaborative environment and increase student engagement in course material.
>
> By virtual classrooms, I am not talking about a gathering place for online learning like a virtual lecture room, rather a collaborative environment that can develop from a particular project.
>
> In my classes, I have slowly been introducing collaborative online tools to increase student engagement.
>
> It was interesting to encounter the issues that students have with a collaborative technology as old as wikis, but it was at the same time eye-opening to considering the level of technological knowledge necessary to jump into virtual worlds.
>
> *Monte stated:* To use the virtual world effectively as a collaborative learning space, it's greatest asset, instructors need to stand back and let things happen.

> *Patrick stated:* A virtual ecology would enhance the types of interactions they could experience as they develop personalized learning goals and become self-directed and "hooked" on collaboration style learning.
>
> The affordances would include, a broad range that I have experienced researching social networking for learning that include assembling information and artifacts, managing and self-managing the systems of a virtual world experience, creating and co-writing with other learners, presenting information to other students, collaborating and communicating through working with teams of learners, sharing materials and resources, exchanging, filtering and mashing information, collecting information and resources, reflecting and self-reflection, monitoring activities and events, asking and giving feedback, and evaluation of new information and sources, as well as self-evaluation.
>
> *Sean stated:* To an existing class, a brick and mortar class, it can provide an out of class experience for conversations, especially in class situations or academic situations where meeting times are once a week or periodic, especially in higher levels of education – Bachelor's, above Bachelor's, and such.
>
> *Bev stated:* From what I gather, something like *Second Life* could encourage more interaction between students in certain classes, especially if it is a collaborative type class where they are working on group projects.

Content Specific Theme

The theme of the content of virtual world environments occurred throughout the interviews in response to Question 2: What are faculty perceptions of the affordances of using virtual world technology in the classroom? and Question 3: What are your perceptions of the challenges of using virtual world technology in the classroom? The patterns within the *content specific* theme varied for virtual world technology in the classroom.

In relation to Question 2, the subject of *content* was a positive aspect with regards to affordances of virtual world technology:

> *Connie stated:* I suppose it could be used to, say, walk an Art History class through the Louvre, which they might find fascinating.

The following are excerpts from the faculty interview transcripts, which relate to the *content* theme with regards to Question 3, which pertain to perceived challenges:

> *Bradley stated:* Content - who develops the content? We are seeing push back on the adoption of eBooks for the very reason that the faculty does not control the content.
>
> *Connie stated*: I am still rather confused about the use of virtual technology in my courses. All of my courses are basically fact-based, and the entire course is needed to teach those facts. I cannot see where any virtual technology similar to *Second Life* would help them in learning those facts.
>
> *Patrick stated:* The self-directed learner does not need the content model to discover what they are interested in learning.
>
> *Sean stated:* Not getting consumer based content but get educational-based content and the other parts will follow.
>
> *Cynthia stated:* Also, some students might think it is more of a game and get wrapped up in the gaming aspect and not pay attention to the content that is being delivered in the class.

Engaged Learning Theme

The theme of *engaged learning* occurred throughout the interviews in response to Question 1: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? and Question 2: What are faculty perceptions of the affordances of using virtual world technology in the classroom? The primary pattern

within the *engaged learning* theme centered on the use virtual world technology in the classroom as a tool that engages students in learning.

The following are excerpts from the faculty interview transcripts that relate to the *engaged learning* theme:

> *Drew stated:* In theory, authors have written about many possible benefits for students engaged with this media.
>
> *Patrick stated:* My research has been in the use of social networking as learning tools, and what I have experienced with my research group of students was a level of engagement and confidence gained by learning to collaborate with blogs, wikis, micro blogs, etc.
>
> *Sean stated:* My perception, specifically for online education, is as a separate entity from a standard classroom, that it will increase the engagement and interactivity as well as eliminate the obvious disconnects that currently exist within an online education system.
>
> *Sheryl stated:* Any atmosphere, which engages students in non-traditional learning I believe to be beneficial, and since virtual world technology not only manifests creativity but also instructs students in multi-dimensional learning via the comforts of home or a personal computer, it's affordances are great.
>
> *Cynthia stated:* I see them [the students] in the student lounge area playing video games in between classes, so I think it makes sense that they may be more engaged in the learning if somehow this technology can be incorporated properly into the classroom.
>
> *Bev stated:* I think the affordance of this technology is to students being engaged in the subject matter, if it is appropriate for the subject taught.

Faculty Development Theme

The theme of faculty development occurred throughout the interviews in response to Question 1: What are faculty perceptions about virtual world technology that

potentially affect its adoption into the classroom? and Question 3: What are your perceptions of the challenges of using virtual world technology in the classroom? The *faculty development* theme emerged as a perceived need for faculty training in order to use or incorporate virtual world technology in the classroom.

The following are excerpts from the faculty interview transcripts, which relate to the *faculty development* theme:

> *Bradley stated:* From the instructor point of view: training, training, training - most instructors would have a difficult time utilizing the technology.
>
> For this to be a viable education tool, rollout would have to include buy-in from administration, faculty and students; training for faculty and students; content-specific material already in the can; and little to no cost for adoption.
>
> *Monte stated:* The biggest challenge in using the virtual worlds in education are my fellow instructors.
>
> *Patrick stated:* Few professors in my school have the interest nor the skills to manipulate the *Second Life* environment but then we have not been allowed to participate on campus, which makes it difficult for them to experience it.
>
> I think the biggest challenge may be in finding teacher practitioners who are willing to spend the time learning, a complex virtual world system, who are also innovative and interested in developing new models for learning that are appropriate in this type of environment.
>
> *Bev stated:* I've heard about *Second Life*, but I do not have any experience in using it. Although, I'm interested in learning how to do it to see if it would be something I could use in the future.

Gaming Theme

The theme of gaming occurred throughout the interviews in response to Question 3: What are your perceptions of the challenges of using virtual world technology in the

classroom? The *gaming* theme emerged as a perception by some of the faculty interviewed that virtual world environments were perhaps more of a game than a learning environment.

The following are excerpts from the faculty interview transcripts that are related to the *gaming* theme:

> *Sondra stated:* Challenges would be to get technology to buy into using this platform - since it is also associated with gaming or a feeling like it is a waste of time, or will attract people that are up to no good.
>
> *Jerry stated:* To me it is just a fun game and a filler of time.
>
> *Drew stated:* I quickly found that, without some guidance, much like the Internet, it was easy to become lost or distracted.
>
> *Connie stated:* I am not, in any sense, anti-technology, but I worry that we are not producing students who know how to think clearly and how to learn and pursue difficult subjects. And I worry that one of the reasons is that we are allowing them to let the technology do all the thinking for them.
>
> *Sean stated:* I think it is a nature of Americans, in general, that the game is okay, but if you are creating this avatar thing, they just haven't understood it in the same way that Korea or Japan, as a population has adopted.
>
> *Cynthia stated:* Some students might think it is more of a game and get wrapped up in the gaming aspect and not pay attention to the content that is being delivered in the class.

High Learning Curve Theme

The theme of a high learning curve occurred throughout the interviews in response to Question 1: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? and Question 3: What are your perceptions of the challenges of using virtual world technology in the classroom? The

high learning curve theme emerged by some of the faculty interviewed as a perception that learning how to use and incorporate virtual world technology in the classroom has a high learning curve for both faculty and students.

The following are excerpts from the faculty interview transcripts which are related to the *high learning curve* theme:

> *Drew stated:* Technology is progressing at a rate quicker than the general student public keeps up with. Certainly the very tech-savvy instructors and students could get into and be productive with a virtual world, but the learning curve for the majority of students is still currently too great to have any meaningful experience in the classroom.
>
> *Monte stated:* The biggest challenge in using the virtual worlds in education are my fellow instructors.
>
> *Patrick stated:* Few professors in my school have the interest nor the skills to manipulate the *Second Life* environment but then we have not been allowed to participate on campus, which makes it difficult for them to experience it.
>
> I think the biggest challenge may be in finding teacher practitioners who are willing to spend the time learning, a complex virtual world system, who are also innovative and interested in developing new models for learning that are appropriate in this type of environment.
>
> *Sean stated:* There is that digital understanding wall sometimes. That's what I'm talking about with the students that they are not ready to make those educational leaps.
>
> *Cynthia stated:* I think the learning curve might be a high one in learning how to use the technology, especially for faculty.
>
> *Bev stated:* Learning how to use the software and having the time to teach it to the students who do not know how to use it, wow, that has the potential of being an issue.

Institution Support Theme

The theme of institution support occurred throughout the interviews in response to Question 1: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? and Question 3: What are your perceptions of the challenges of using virtual world technology in the classroom? The *institution support* theme emerged from some of the faculty interviewed that there is perhaps a perception that the design colleges where the faculty teach are not supportive of using virtual world technology in the classroom. The following are excerpts from the faculty interview transcripts, which relate to the *institution support* theme:

> *Bradley stated:* For this to be a viable education tool, rollout would have to include buy-in from administration, faculty and students.
>
> *Monte stated:* Deadwood and dinosaurs will drag down the momentum of a virtual world curriculum despite the best efforts of the administration and techno-savvy faculty.
>
> *Connie stated:* From my perspective, the biggest challenge would be in initially providing the students with the background to make a virtual experience intellectually worthwhile.
>
> *Patrick stated:* Few professors in my school have interest nor the skills to manipulate the *Second Life* environment but then we have not been allowed to participate on campus, which makes it difficult for them to experience it.
>
> I was frustrated that my school would not allow us to work with *Second Life* back when I was starting research for my doctorate. I can only assume this will continue to be an issue for institutions that have tight control from IT departments.
>
> *Sean stated:* Affordability, high speed Internet access could also limit a person's access as well as equipment necessary to be able to do audio and visual exchanges in this way can be a limiting factor. I mean it's the digital divide issues and

> the digital apartheid issues that we have been wrestling with ever since.

Interactive Learning Theme

The theme of interactive learning occurred throughout the interviews in response to Question 1: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? and Question 2: What are faculty perceptions of the affordances of using virtual world technology in the classroom? The primary theme within the *interactive learning* theme centered on the use virtual world technology in the classroom as a tool that encourages interaction between students and the learning experience.

The following are excerpts from the faculty interview transcripts, which relate to the *interactive learning* theme:

> *Drew stated:* It seemed to me that second life has a whole virtual visual culture as well as a culture that shares audio files. As our school has degree programs relating to animation, game design, fashion retail, audio production, among others that might find projects relating to this particular media.

> *Patrick stated: Second Life* offers a complex system of activities that include synchronous interaction between real people, a sense of social presence that fosters confidence and self-growth, as well as providing virtual spaces for learners and educators from many countries to form communities of practice that can enable new learning experiences to be fostered.

> *Bob stated:* I see the application of virtual world technology as a way of offering the student media rich synchronous and asynchronous interaction with course material. It also suggests the opportunity for larger group interaction as well as an opportunity for presenting the class group with alternative learning opportunities, e.g. virtual field trips.

> *Sean stated:* My perception, specifically for online education, is as a separate entity from a standard classroom, that it will increase the engagement and interactivity as well as eliminate the obvious disconnects that currently exist within an online education system.
>
> [Virtual world technology] can add another level of interaction within a class, an outside of the classroom experience that can be integrated into a process of discussion, either discussion groups or situations that allow for small group discussion to take place or different interactivity within say, research.

Not Appropriate for the Subject Taught Theme

The theme of virtual world technology as not appropriate for the subject taught occurred throughout the interviews in response to Question 1: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? and Question 3: What are your perceptions of the challenges of using virtual world technology in the classroom? The *not appropriate for subject taught* theme emerged by some of the faculty interviewed as a perception that using virtual world technology is not appropriate for the particular subject that the faculty taught.

The following are excerpts from the faculty interview transcripts, which relate to the *not appropriate for subject taught* theme:

> *Bradley stated:* Virtual world technology would likely not apply to the subjects I currently teach.
>
> *Jerry stated:* The younger students - 18 - 24 year olds to talk about the 'games' but more in the fantasy fighting games then anything that I could see would have educational benefit.
>
> *Drew stated:* Unfortunately, I am currently instructing in the art foundations area of the school which I am finding has very little use for virtual worlds in that the projects typically take on a very traditional art approach

> *Connie stated:* I am still rather confused about the use of virtual technology in my courses. All of my courses are basically fact-based, and the entire course is needed to teach those facts. I cannot see where any virtual technology similar to *Second Life* would help them in learning those facts.
>
> *Sheryl stated:* Though I do not believe that virtual world technology is applicable as a viable teaching supplement within the classes I instruct I do see how the technology could be useful in other disciplines.
>
> *Cynthia stated:* I do not believe that virtual world technology is really something that I would use as a teaching tool in my courses, at least at this time.
>
> *Bev stated:* I think virtual world technology is fascinating, but I do not think it is suitable as a teaching tool for the particular classes I teach.
>
> I think the affordance of this technology is to students being engaged in the subject matter, if it is appropriate for the subject taught.

Students Relate to the Technology Theme

The theme of the students being able to relate to the technology occurred throughout the interviews in response to Question 1: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? and Question 2: What are faculty perceptions of the affordances of using virtual world technology in the classroom? The *students relate to the technology* theme centered on the perception by the faculty interviewed that students in their classes can relate to using virtual world technology in the classroom since perhaps students use many other social networking applications.

The following are excerpts from the faculty interview transcripts, which associate to the *students relate to the technology* theme:

> *Drew stated:* The benefit of the virtual world is that it seems more physical of a meeting place than a chat room and it has people from all over the globe engaged in this online community. The dynamism for many will make it easier to connect to what is being said and students will be able to engage in this technology whenever and wherever they need.
>
> *Bob stated:* I see the application of virtual world technology as a way of offering the student media rich synchronous and asynchronous interaction with course material. It also suggests the opportunity for larger group interaction as well as an opportunity for presenting the class group with alternative learning opportunities, e.g. virtual field trips.
>
> *Sean stated:* We have a lot of technologically savvy students. Look at the Animation, Video, Audio guys.
>
> Everybody else is pretty tight with technology and they utilize other technologies than social network technologies.
>
> *Cynthia stated:* From what little I know about virtual worlds, it seems as if students might be interested in seeing this technology used in the classroom because that can relate to the technology.

Social Aspects Theme

The theme of social aspects of the technology occurred throughout the interviews in response to Question 1: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? Question 2: What are faculty perceptions of the affordances of using virtual world technology in the classroom? and Question 3: What are your perceptions of the challenges of using virtual world technology in the classroom? The *social aspects* of technology theme centered on the use of virtual world technology in the classroom as a social networking tool.

The following are excerpts from the faculty interview transcripts, which relate to the *social aspects* theme in reference to Question 1:

> *Monte stated:* To our students, virtual worlds ranging from *Second Life* to *Facebook* are simply an accepted way of interfacing with people, no different from face to face.
>
> *Patrick stated:* The opportunities to develop new forms of community building and sharing of information around focused domains would be my primary concern.
>
> A virtual ecology would enhance the types of interactions they could experience as they develop personalized learning goals and become self-directed and "hooked" on collaboration style learning.
>
> *Sean stated:* I think it would improve retention, not only with the students and the material in the course but also with the retention of the material because you are re-introducing or introducing the social interactive process of the classroom.

The following is an excerpt from the faculty interview transcripts, which relate to the *social aspects* theme in reference to Question 2:

> *Patrick stated:* Virtual world technology offers enormous potential as a learning ecology that can support communication, collaboration, and a variety of social learning affordances. *Second Life* offers a complex system of activities that include synchronous interaction between real people, a sense of social presence that fosters confidence and self-growth, as well as providing virtual spaces for learners and educators from many countries to form communities of practice that can enable new learning experiences to be fostered.

The following is an excerpt from the faculty interview transcripts, which relate to the social aspects code in reference to Question 3:

> *Bradley stated:* There's the social issue. Students are already removed from face to face; social interaction due to texting, and virtual reality would increase their lack of social skills.

Time Theme

The theme of time occurred throughout the interviews in response to Question 3: What are your perceptions of the challenges of using virtual world technology in the classroom? The *time* theme centered on the amount of time it takes to learn to use or incorporate virtual world technology in the classroom.

The following are excerpts from the faculty interview transcripts, which relate to the *time* theme:

> *Monte stated*: The possibilities offered by the virtual world are limitless; we are faced with only the choice of how to best use them in the time we have to prepare our classes and curriculum.
>
> *Connie stated:* From my perspective, the biggest challenge would be in initially providing the students with the background to make a virtual experience intellectually worthwhile.
>
> *Patrick stated:* I think the biggest challenge may be in finding teacher practitioners who are willing to spend the time learning, a complex virtual world system, who are also innovative and interested in developing new models for learning that are appropriate in this type of environment
>
> *Cynthia stated:* We are so busy making sure the students are meeting the competencies of the courses, that it is difficult to find the time to learn how to use something like virtual worlds in the classroom.
>
> *Bev stated:* It is difficult enough to teach the content necessary in a 10-week quarter, without adding teaching something like *Second Life* to the students in order to use it in the classroom. I think it might also take a lot of time to learn how to utilize this type of technology in the classroom to make it an effective learning experience for the students.

Useful Teaching Tool Theme

The theme of a *useful teaching tool* occurred throughout the interviews in response to Question 1: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? and Question 2: What are faculty perceptions of the affordances of using virtual world technology in the classroom? The *useful teaching* tool theme centered on faculty perception of how using virtual world technology in the classroom can be a useful teaching tool or teaching method.

The following are excerpts from the faculty interview transcripts, which relate to the *useful teaching tool* theme:

> *Sondra stated:* "I think the benefits would be to see real creativity and originality at work and see it as true to real life as possible. *Second Life* is as close to real life short of doing actual full-scale models.
>
> *Jerry stated*: I believe, though, that this could be a useful teaching tool for those individuals and ages who are familiar with these world, especially in the area of economics or even political science.
>
> *Drew stated:* As our school has degree programs relating to animation, game design, fashion retail, audio production, among others that might find projects relating to this particular media. Virtual world technology is a great tool for creating virtual classrooms.
>
> For example: I was considering projects combining majors to produce products (clothing, audio files, etc) for the virtual world, and creating virtual retail locations which can be used for market research. Animation and Game Art and Design students would be ideal to team up with other majors to conduct such projects.
>
> *Monte stated:* Virtual worlds are useful in many disciplines, but only with calculated effort on the part of the instructor.

To our students, virtual worlds ranging from *Second Life* to *Facebook* are simply an accepted way of interfacing with people, no different from face to face contact. In more generalized terms, data is data to them no matter if it is born digital or not; asynchronous communication blends seamlessly with real time.

The possibilities offered by the virtual world are limitless; we are faced with only the choice of how to best use them in the time we have to prepare our classes and curriculum.

Connie stated: I believe that the technology would be most useful in courses where students already know a fair amount about a subject and can, through the technology, apply their knowledge in ways that would not be feasible in the non-virtual classroom. I suppose it could be used to, say, walk an Art History class through the Louvre, which they might find fascinating.

Patrick stated: Virtual world technology offers enormous potential as a learning ecology that can support communication, collaboration, and a variety of social learning affordances.

Bob stated: I see the application of virtual world technology as a way of offering the student media rich synchronous and asynchronous interaction with course material. It also suggests the opportunity for larger group interaction as well as an opportunity for presenting the class group with alternative learning opportunities, e.g. virtual field trips.

Add to this the fact that the delivery can either be synchronous or asynchronous and you have the opportunity for electronic lecture and discussion.

Sean stated: My perception, specifically for online education, is as a separate entity from a standard classroom, that it will increase the engagement and interactivity as well as eliminate the obvious disconnects that currently exist within an online education system.

To an existing class, a brick and mortar class, it can provide an out of class experience for conversations, especially in class situations or academic situations where meeting times are once a week or periodic, especially in higher levels of

> education – Bachelor's, above Bachelor's, and such.
>
> *Sheryl stated:* Any atmosphere which engages students in non-traditional learning I believe to be beneficial, and since virtual world technology not only manifests creativity but also instructs students in multi-dimensional learning via the comforts of home or a personal computer, it's affordances are great.
>
> *Bev stated:* I think the possibilities are there for certain subjects, like Animation or Game Programming, where students can experience an environment that will engage them in the subject, and simulate the type of possibilities for their particular major.

Interview Summary

The coding of the interview transcripts revealed 14 themes. The themes that emerged as affordances to using virtual world technology in the classroom included: useful teaching tool, collaborative learning, engaged learning, interactive learning, students relate to the technology, and social aspects. The themes that emerged more as challenges to using virtual world technology in the classroom included: accessibility to the appropriate hardware and software, content specific, faculty development, gaming, high learning curve, institutional support, not appropriate for subject taught, and time.

On the affordance side, the majority of the interviewees cited virtual world technology as a useful teaching tool or a potential useful teaching tool in the classroom. The collaborative learning theme emerged as an affordance with many of the interviewees. The engaged learning and interactive learning themes were discussed frequently among the interviews. Similarly, *the students relate to the technology* theme was considered an affordance of virtual world technology among the interviewees.

Accessibility to the hardware and software necessary to implement virtual world technology in the classroom appeared to be a major negative concern among the faculty

interviewed. The accessibility to the appropriate hardware and software theme occurred many times between the majority of the interviewees. For all of those interviewees, accessibility was considered a challenge of using virtual world technology in the classroom. Another negative concern that appeared frequently between the interviewees was the not appropriate for subject taught theme. Likewise, many interviewees felt that institutional support was a challenge in using virtual world technology in their courses. The gaming aspect was seen as a challenge to the faculty interviewed. Moreover, the specific content available in virtual environments was used in context as a challenge to the majority of the interviewees who spoke about content, with only one interviewee, seeing content on a positive note. The faculty development and social aspects themes were discussed among the interviews, having both a positive and negative context. Finally, the theme that received the least amount of discussion was the time theme, but the discussion was seen as a challenge to the interviewees.

Triangulation of the Data

A mixed methods study was used for triangulation purposes. Some of the trends seen in the interview responses support the data findings in the survey responses. Some of the interview responses contradict the survey results. First of all, the survey response indicates between a "Neutral" and "Agree" response ($M = 3.30$) for the statement that virtual world technology will help increase collaborative learning (Question 38). Many of the faculty interviewed in the post-survey interview felt that collaboration is an affordance of using virtual world technology in the classroom.

Secondly, the survey data implies that there is a level of agreement on virtual world technology providing an engaging learning experience (Question 42), with $M =$

3.50. The interview data corroborates this finding perceiving that virtual world technology engages students in learning.

Thirdly, the survey data indicates a level of agreement on beliefs that students respond positively to an interactive learning environment, such as virtual worlds (Question 41: $M = 3.57$). The interview data supports this statement with several of the faculty interviewed discussing the interactive learning aspect of virtual world technology as an affordance of using the technology.

Fourthly, the survey data implies that there is a level of agreement on virtual world technology as a teaching tool to promote an environment where students discover knowledge as they experience and participate in activities (Question 40), with $M = 3.51$. This question can be interpreted that virtual world technology can be seen as a useful teaching tool to promote an environment where students discover knowledge as they experience and participate in activities within the virtual environment. The interview data collaborates this finding with the majority of the interviewees discussing that they perceive virtual world technology as a useful teaching tool.

Finally, the survey data indicates a level of agreement on faculty development opportunities relating to technology as well as virtual world technology (Question 27: $M = 3.87$; Question 28: $M = 3.99$; Question 30: $M = 3.94$; and Question 49: $M = 3.60$). The interview data supports these statements with several of the faculty interviewed discussing faculty development opportunities as an important aspect of the ability to use and incorporate virtual world technology in the classroom.

When comparing the quantitative survey results to the post-survey interviews, it is interesting to note that discrepancies exist between the survey responses and the

interview responses. The interview responses indicate half of the interviewees feel that there is a high learning curve to virtual world technology and that it takes too much time to learn how to use the technology. The interviewees state that faculty do not have the time or skills to learn virtual world technology and that students may also be challenged in learning how to use the technology. However, the survey response indicates a disagreement with the above perceptions of the interviewees: The survey response indicates that faculty feel that they *do* have enough personal technology skills to integrate virtual world technology into teaching (Question 13); and they feel that they *do* have the time to spend in integrating technology as well as virtual world technology into teaching and learning (Question 14 and Question 36). Many of the interviewees indicate that they perceive virtual world technology as not appropriate for the subject being taught. However, the survey responses indicate between disagree and neutral to the statement that virtual world technology is not appropriate for the subject taught (Question 46: $M = 2.84$).

Summary of Results

This mixed methods study was intended to present data in order to possibly provide insights to design college faculty perceptions of the adoption of virtual world technology into the classroom. This study collected data through a survey and post-survey interviews administered to faculty of 21 design colleges. The quantitative survey instrument included questions about the usage of technology, including virtual world technology, in the higher education classroom. The Virtual Worlds Faculty Survey presented descriptive data on the research study sample and revealed the resulting means and standard deviations on the construct indicators. The results of the Virtual World

Faculty Survey indicate that the respondents in general agree (between "Neutral" and "Agree") with the positive questions and disagree (between "Neutral" and "Disagree") with the negative questions on the survey, indicating an overall perception that virtual world technology offers affordances for faculty in the classroom. There are only two questions on the survey that the faculty perceive as a challenge to using virtual world technology in the classroom: the faculty perceive that they do not know how to incorporate virtual world technology in their courses, and they cannot depend on the essential software (such as *Second Life* or other virtual environment software) in order to use virtual world technology in their courses.

A reliability analysis of the survey items was conducted measuring the internal consistency reliability. A chi-square goodness of fit test measured the observed versus expected frequencies of selected variables. A Spearman rank correlation analysis was performed to measure the association between the selected variables and the survey responses to determine if there was an association between the selected variables and the Likert-type scaled questions. The correlation analysis revealed that there were very few relationships between the selected variables (AgeGroup, NSubjectTaught, NCollegeLocation, YearsTaught, and TeachOnline) and responses to the questions in the survey. The few correlations that were found between the selected variables and the responses to the survey were very weak correlations. There was only one association (and even so, a weak association) between age group and the use of multimedia technology tools when preparing courses. This association was a negative correlation, meaning that the respondents felt that they do not use this type of technology when preparing their courses, as a group. On the other hand, the survey response shows an agreement with this

statement (Question 32) with $M = 3.90$. However, this does not mean if I was to run only one age group against the question, that the outcome would be the same. A future research recommendation could include separating out the age groups and comparing the separate age groups to the questions.

The only other correlation was between the NSubjectTaught variable and the survey questions was the statement that the respondents did not feel they had enough technology skills to integrate virtual world technology into their teaching. A future recommendation would be to research faculty development opportunities to address this perception, since this issue is beyond the scope of this study.

The post-survey interviewees were selected by random purposeful sampling, which resulted in faculty that represented a range of academic backgrounds and technology perspectives, almost balanced between male and female, and the years of teaching ranging from six to over 20 years. The subjects taught by the final interviewees included Animation, Art Foundations, Design Management, General Education, Graphic Design, Interior Design, and Video Production. The interviewees represented a cross-section of the subjects taught. College locations of the interviewees included California, Colorado, Georgia, Illinois, South Carolina, Texas, Virginia, and Washington. The results of the random purposeful sampling presented interviewees that provided a cross-section of the survey sample, allowing different perspectives about virtual world technology. In reference to using purposeful sampling, Creswell and Plano Clark (2007) state:

> One of the more popular [purposeful sampling] is maximal variation sampling, in which individuals are chosen who hold different perspectives on the central phenomenon. The criteria for maximizing differences depend on the study, but it might be race, gender, level of schooling, or any number of factors that would differentiate the participants.

> The central idea is that if participants are purposefully chosen to be different in the first place, then their views will reflect this difference and provide a good qualitative study. (p.112)

In regards to the results of the purposeful sampling for this study, the interviews provided a more in-depth, thick description of faculty perceptions of virtual world technology and the possibility of adopting it as a teaching tool in the higher education classroom.

The post-survey interviews were coded, using a hybrid grounded theory approach, where the data were coded in a constant comparative method (Rubin & Rubin, 2005). The themes that emerged from the interview data were reflective of the responses of the questions posed, the subjects that the interviewees taught, as well as the interviewee's perception about virtual world technology as a teaching tool. The resulting qualitative data provided patterns and themes that emerged between the interviews, which were triangulated with the quantitative data from the survey analysis. The qualitative data results indicated that the faculty perceive virtual world technology as a collaborative, engaging, useful teaching tool where students can relate to the technology and the social aspects that virtual world technology affords. The qualitative data results also indicate that faculty perceive challenges to using virtual technology in the classroom including accessibility to the essential hardware and software required to use the technology, as well as concerns about their respective institution's support in using the technology. Another perceived challenge was whether faculty development opportunities would be provided to learn how to use and incorporate virtual world technology in the classroom.

In general, the interviewees revealed strong feelings towards the use of virtual world technology, especially as a useful teaching tool in the classroom, detailing how virtual world technology can benefit the students. The interviewees were also able to

detail the lack of accessibility to the hardware and software essential to use virtual world technology in their classes. They gave thick description of their perceived challenges with their Information Technology (IT) departments as well as their perceived lack of support from their colleges to use the technology. Thus, the interviewees were able to expand on their perceptions of the affordances and the challenges of using virtual world technology in the classroom, primarily supporting the quantitative results from the survey. On the other hand, discrepancies between the survey results and the interview results were seen in reference to faculty perception about having the time or skills to learn virtual world technology and whether virtual world technology is appropriate for the subject taught.

CHAPTER 5

SUMMARY, DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

The primary focus of this study was to investigate how design college faculty perceive the use of virtual world technology as a teaching tool in the classroom. Adoption theories were explored as an underlying conceptual framework for this study. This conceptual framework assisted in providing an understanding of adoption patterns and perceptions of faculty, which provided insights to faculty behavior in the classroom (such as the tendency to adopt new technologies). Findings from the mixed methods analysis supported the conceptual framework addressed in the literature review. The categories addressed in the literature review were: (a) faculty perceptions about adopting virtual world technology into the classroom, (b) faculty perceptions and epistemological beliefs, (c) faculty perceptions of the affordances of using virtual world technology in the classroom, and (d) faculty perceptions of the challenges of using virtual world technology in the classroom.

The research questions guiding this study were intended to address the perception of design college faculty of adopting virtual world technology as a teaching method in the higher education classroom. The guiding questions were: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? (b) What are faculty perceptions of the affordances of using virtual world technology in the classroom? (c) What are faculty perceptions of the challenges of using virtual world

technology in the classroom? The following topics will be addressed in this chapter: (1) a discussion of the findings; (2) conclusions; (3) implications; (4) limitations of results; and (5) directions for future research.

Summary of Research Design and Findings

The goal of this study was to add insight to how individual perceptions inform faculty choices, which could potentially affect whether a technology (such as virtual world technology) is adopted in the classroom. As higher education institutions are challenged with the task of educating a technology savvy generation of students, there is a concern whether colleges and their faculty are prepared to meet the needs of today's students. This mixed methods study collected data through an online survey and post-survey semi-structured interviews with faculty teaching in twenty design colleges across the United States and one design college in Canada.

The Virtual World Faculty Survey Findings

The first part of the Virtual Worlds Faculty Survey addressed faculty perception of using technology, in general, as a teaching tool in the classroom. By gathering perceptions from faculty about general technology adoption and usage, a technology baseline was established that provided a foundation for faculty perceptions of virtual world technology adoption and usage. The second part of the Virtual World Faculty Survey specifically addressed faculty perceptions of the use of virtual world technology in the higher education classroom. The results of the survey reflect the population of the students taught at the design colleges included in the study. The respondents teach students who are majoring in applied art programs that tend to be technology-driven, interactive-type programs. The faculty who responded to the survey may have been

interested in using technology in their courses, whether or not they were interested in virtual world technology. Furthermore, since the faculty surveyed in this study feel they tend to adopt new technologies as they are introduced, it is reasonable to state that this feeling could be reflective of the faculty perceptions of the type of students they teach.

The findings of the survey fell into categories of perceived affordances and challenges of adopting virtual world technology in the higher education classroom. The findings of the survey imply that the faculty perceive there are affordances of using virtual world technology in the classroom. The faculty respondents' perceived affordances of using virtual world technology in the classroom are as follows:

Affordances - outcomes of the survey

- Virtual world technology provides an immersive learning environment
- Students respond to an interactive learning environment such as virtual worlds
- Using virtual world technology in the classroom promotes discovery learning
- There are advantages to using virtual world technology in their courses
- Virtual world technology is appropriate for the subject taught
- Virtual world technology encourages more student-centered learning
- Virtual world technology promotes collaborative learning opportunities
- Virtual world technology engages students in the learning
- Students learn by constructing their own knowledge in virtual worlds

The perceived affordances are consistent with Kluge and Riley's (2008) study that states that transfer of knowledge of learning strategies can occur from the real world to

the virtual world by learners implementing role-playing and problem solving activities in the virtual world. The faculty surveyed in this study agree with the literature in that the affordances of using virtual world technology in the classroom include the effect this technology potentially has on student learning outcomes. The survey respondents in this study also agree with Kluge and Riley (2008), Duncan (2005), Steinkuehler and Duncan (2008), Hodge, Tabrizi, and Wuensch (2007), Mullen, Beilke, and Brooks (2007), and Coffman and Klinger (2007), that virtual world environments have the potential to engage students in the learning, encourage collaboration and interactivity, promote a learner-centered environment, and provide immersive learning activities. The survey respondents perceive many of the same affordances in using virtual world technology in their courses as noted in the literature.

Challenges – outcomes of the survey

- Faculty perceive that they do not know how to incorporate virtual world technology into their courses
- Faculty perceive that they cannot depend on access to essential software needed to use virtual world technology in the classroom

Post-survey Interview Findings

Due to the questions posed to the interviewees, the themes of the interviews fell along the lines of affordances or challenges in using virtual world technology in the classroom. The following themes are perceived as affordances by the faculty:

Affordances – the themes that emerged during the interviews

- Virtual world technology as a useful teaching tool in the classroom
- Virtual world technology can promote collaboration between students

- Virtual world technology can engage students in the learning
- Virtual world technology can promote interactive learning in the classroom
- Students can relate to the technology used in virtual world environments
- Students can relate to the social aspects of virtual world technology
- Virtual world technology encourages creativity with the possibilities being limitless
- Virtual world technology relates specifically to the degree programs of the students in their colleges

The perceptions of the interviewees concur with the literature on the affordances of virtual world technology on student learning outcomes, as exemplified in Coffman and Klinger (2007), Hodge, Tabrizi, Farwell, and Wuensch (2007), Kluge and Riley (2008), and Wang and Gloviczki (2008). Since the interviewees teach students who are inclined towards technology (having been immersed in technology from an early age), perhaps the majority of the interviewees recognize the need to relate to the students they teach by entertaining the prospect of introducing virtual world technology as a teaching tool in their classes.

Collaboration between students is discussed as a perceived affordance of virtual world technology in many of the interviews. Working in teams of learners, encouraging small discussion groups and interaction between learners, and teaming up with other majors, appear as affordances to the students of using virtual world technology within the collaboration theme. Perhaps this theme is also indicative of the nature of the applied arts programs at the design colleges where the interviewees teach. For example, in the

advertising field, it is common to work in teams to develop and execute a concept. Most jobs in advertising involve collaboration between account executives, art directors, designers, copywriters, and photographers.

Engaged learning emerged as an affordance, as the faculty interviewed perceive that virtual world technology can increase the engagement of students in the content being taught in classes; increase the connectivity with the course material; and increase the level of confidence of the learner due to the engagement with the course content. Many of the interviewees perceive engaged learning as an affordance of virtual world technology perhaps due to the type of courses they teach or due to the students they teach. Many of the interviewees appear aware that the students they teach are interested in interactive-type learning and perhaps feel that they can engage the students in learning if they can "speak their language."

The interviewees perceive that virtual world technology encourages interaction between students and the learning experience. The faculty who perceived interactivity as an affordance to virtual world technology felt that the technology relates to the interactive majors taught in the colleges; encourages synchronous interaction in a learning situation; increases the engagement and interaction in the learning; and contributes to social interaction in a learning environment. The perception of interaction as an affordance of virtual world technology is in accord with the literature reviewed in this study. Interaction can also be viewed to be in association with engaged learning and collaboration, since many times these perceived affordances are intertwined.

The faculty interviewed also perceive that students relate to the technology that virtual world technology affords. Several of the faculty interviewed felt that since their

students are technologically savvy, their students would be interested in using this type of technology in the classroom. It was actually surprising that more of the interviewees did not mention the fact that the students in their classes can relate to virtual world technology, since the interviewees felt strongly that the technology is engaging, interactive, and collaborative, similar to the technology that the students use with social networking tools, such as *Facebook*, *Twitter*, *MySpace*, blogs, and wikis.

In addition, the interviewees who discussed social aspects of virtual world technology felt that, in general, the social aspects are an affordance of using the technology in the classroom. These faculty perceive virtual world technology as being similar to other social networking applications that students use. In addition, there is a perception that the social aspect of virtual world technology is an accepted way of interacting with people, much like face-to-face interaction. Again, it was surprising that more of the interviewees did not mention the social aspects of virtual world technology due to the technologically savvy nature of the students that the interviewees teach. Possibly this lack of awareness on the part of the majority of the interviewees is due to the faculty feeling that a social aspect is not important in learning. On the other hand, perhaps some of the interviewees were not aware of the types of social opportunities that exist in virtual worlds. Perhaps some of the interviewees' pedagogical beliefs are based on their own experiences as a student, reflecting on how they were taught when they were in school without the availability of social networking applications.

Challenges – the themes that emerged during the interviews

- Accessibility to the hardware and software essential for using virtual world technology in the classroom and lack of institutional support

- The question of who develops the content in the virtual world environments
- Virtual world technology is not appropriate for the subject taught
- Gaming aspect of virtual world technology
- Faculty perceived that faculty development was necessary to learn how to use and incorporate virtual world technology in the classroom, since they perceive that it has a high learning curve

Within the themes identified as barriers to faculty adopting virtual world technology in the classroom, it appears that accessibility to using virtual world technology as a teaching tool is seen as the primary barrier between the majority of the interviewees. The accessibility concern is exemplified in that faculty perceive that their information technology (IT) departments will not allow the use of a MUVE, such as *Second Life*, in the classroom due to some concerns with bandwidth issues on the networked systems which are used in the colleges. The faculty also state that some students and faculty will not be able to access the technology due to limitations such as lack of access to the Internet at home. There is also a concern about the lack of owning a personal computer or the speed of the personal computer that either faculty and/or students own. The faculty who expressed concern over the accessibility issue perceive that accessibility to the hardware and software required to use virtual world technology is a challenge for both students and faculty. Some of the faculty interviewed expressed concern on who develops the content within the virtual environment and if the content is appropriate for the subject they teach. In addition, the gaming theme appears as a negative association with virtual world technology among the faculty interviewed. The

interviewees felt that the students can become distracted from the content presented in the class indicating that students think that virtual world environments are more of a game than a learning environment.

A concern over the need for faculty development in learning how to use virtual world technology in the classroom emerged in this study (in both the survey responses and the interview responses). In interviewing the 12 interviewees, I noticed that many of the faculty interviewed expressed the opinion that they needed training in virtual world technologies in order know how to incorporate virtual world technology into their courses. The interviewees perceive that many of the faculty (including themselves) do not possess the necessary interest or skills to learn how to use virtual world technology in the classroom. My feeling is that training opportunities in virtual world technologies may address this particular set of perceived challenges. Some of the faculty I interviewed felt that they do not have enough time to teach the learning outcomes for the subject, much less have the time to learn (and possibly teach the students) how to use virtual world technology in their courses. They perceive the technology as being difficult to learn and that it takes time to learn the technology – time that they feel they might not have. They expressed that not only does it take time to learn how to use the technology as a teaching tool, but also that it takes time to teach the students who are not familiar with the technology. They also felt that there is not enough time to teach the content of a course within a quarter, without adding the aspect of teaching how to use a virtual world environment. The faculty development concern is consistent with the perception of the faculty who participated in the pilot study I performed (Appendix E). The faculty in my pilot study were very interested in learning more about how to incorporate virtual world

technology in their courses, but they felt like they needed more faculty development in order to feel confident in using the technology in their courses. In order to address these perceived challenges to using virtual world technology in the classroom, the colleges should investigate faculty development opportunities that would assist the faculty in becoming comfortable with new technology (such as virtual world technology) and learning how to incorporate the technology in their courses, as emphasized in the literature by Kluge and Riley (2008).

Discussion

The accessibility challenge is noteworthy, since the design colleges are perceived as leaders of technology usage, due to the specific applied arts programs taught at the colleges. It appears a contradiction that the design colleges focus on technology-driven, interactive-type programs but the interviewees perceive that the faculty do not have the support needed to use leading-edge technology as a teaching tool in the classroom. The perceived lack of institutional support in the design colleges is another theme that emerged in the post-survey interviews. It seems that some of the same issues with accessibility are common with the concerns about institutional support. Faculty perceive that their institution does not support using virtual world technology since it is not allowed on the network in their colleges. They also feel that the administration of their colleges would need to be a stakeholder in virtual world technology as an initiative in order for the technology to become a viable teaching tool in the classroom. The perceived lack of institutional support theme is consistent with the accessibility theme, and thus some of the same concerns reflected in the accessibility theme are seen in the institutional

support theme. The design colleges perhaps need to examine why their faculty perceive that there is lack of institutional support of technology access to the faculty.

The interviews revealed a concern over the question of the content of the learning materials in a virtual world environment. Concerns were expressed on who develops the content of the courses using virtual world technology and whether the content will help learning outcomes of a particular course. In addition, the interviewees who expressed concern over content feel that the students may be inclined to be distracted by either the consumer content or the virtual environment itself, rather than concentrate on the educational content being delivered in the class. From my personal observations, perhaps one reason the interviewees are concerned over content in virtual world environment is the lack of control the faculty perceive they have over what their students will encounter in the virtual world environment. From my experience teaching in a computer lab, some of the students are surfing the Internet and not paying attention to the content being delivered in the classroom. Perhaps the interviewees feel that in a virtual world environment, students will be even more distracted than usual in a class that is conducted in a computer lab.

The gaming aspect of new technologies is also reflected in the literature review (Sugar, Crawley, & Fine, 2004). Sugar, et. al., cite the "entertainment" aspect of new technologies that are introduced into the classroom as a negative aspect of the findings in their research. Sugar, et. al., feel that some students tend to be too dependent on technology in the classroom, and not engaged in the learning content due to the "entertainment" value of the technology used. Possibly this gaming perception is due to the interviewees perhaps being more digital immigrants than digital natives. Future

research could include sorting the interviewees into digital natives versus digital immigrants in order to ascertain if there is a difference in their opinions on the perceived gaming aspect of virtual world technology.

Several of the interviewees perceived virtual world technology as not appropriate for the subjects they teach. They expressed that either they had little use for the technology in their classes; are not sold on the uses of the technology; are confused on how they would use the technology in their classes; or do not think the technology is a feasible teaching tool for the classes they teach (agreeing with Genier-Winther, 1999). From my experience as a faculty member teaching in a design college, I can see that perhaps virtual world technology is not the appropriate tool for every subject. For example, a virtual world environment (such as *Second Life*) might not be the best tool to teach life drawing, since the students draw live models in order to learn to transfer three-dimensional objects into two-dimensional drawings.

Conclusions

Integration of the findings of the quantitative analyses and the qualitative analyses has led to conclusions for this study based upon the findings. The conclusions are organized by the research questions posed for this study. The specific research question posed in this study was: What are the perceptions of design college faculty regarding the use of virtual world technology in their courses? Guiding questions included: (a) What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom? (b) What are faculty perceptions of the affordances of using virtual world technology in the classroom? (c) What are faculty perceptions of the challenges of using virtual world technology in the classroom?

Research Question 1: What are the perceptions of design college faculty regarding the use of virtual world technology in their courses?

Overall, the findings in this study imply that faculty have a favorable perception on virtual world technology and its potential to have a positive effect on student learning outcomes. The faculty had an overall perception that technology integration into teaching and learning is very important for student learning outcomes as well as agree that there are advantages to using virtual world technology in the classroom. The overall agreement is perhaps reflective of the faculty who participated in the survey and the interviews, reflective on the subjects the faculty teach, and/or reflective of the types of students they teach. The interview data supports the survey data in that the interviewees overall perceive that virtual world technology is useful and it allows the students to feel engaged in the learning process. The findings imply that faculty are receptive to the possibilities virtual world technology offers.

Research Question 2: What are faculty perceptions about virtual world technology that potentially affect its adoption into the classroom?

The faculty in this study perceive that they adopt new technologies as they are introduced, which is reflective of Rogers (2003) early adopter category (even though the faculty were not asked to self-categorize themselves into Rogers' adopter categories). The early adopter perception of the faculty respondents would be indicative of faculty who teach at design colleges that require constant infusion of new technologies in order to stay current with the industry trends of interactive-type majors at an applied arts college. The faculty also feel that incorporating a virtual world assignment in their class will engage their students in the learning, which is in line with faculty who teach students

who major in applied arts programs such as the ones offered in the colleges involved in the study. Faculty perceive that virtual world technology is a useful teaching tool in the classroom, being useful in many disciplines. Collaboration is seen as an affordance with virtual world technology, which is especially important to design college students as they embark on professions that mostly depend on working in creative teams. In addition, faculty perceive that virtual world technology offers the students media-rich interaction with course material that can either be synchronous or asynchronous, which is in agreement with the Kluge and Riley (2008) article.

Research Question 3: What are faculty perceptions of the affordances of using virtual world technology in the classroom?

Faculty members perceive that virtual world technology has the potential to engage students in learning by promoting discovery learning (agreeing with Coffman & Klinger, 2007, and Kluge & Riley, 2008). Faculty also perceive that virtual world technology promotes an interactive learning environment (consistent with Hodge, Tabrizi, Farwell, & Wuensch, 2007, and Mullen, Beilke, & Brooks, 2007). Hodge, et. al., (2007) claim that using virtual worlds or environments as a teaching tool in the classroom benefits students by offering interactive learning environments. Mullen, et. al., (2007) promote the theory that virtual learning environments encourage students to immerse themselves in learning through interactive learning environments, thus demonstrating that faculty perceive that virtual world technology has affordances.

Faculty (both the survey respondents and the interviewees in this study) perceive that virtual world technology helps increase collaborative learning, (agreeing with Steinkuehler & Duncan, 2008), and increases more student-centered learning (agreeing

with Kluge & Riley, 2008). Kluge and Riley (2008) believe that an affordance of virtual world technology is the opportunity to shift from a teacher-centered classroom to a learner-centered classroom. The findings of this study also imply that faculty perceive that virtual world technology creates an immersive learning environment. Kluge and Riley also support the theory that higher education institutions will need to consider adopting immersive methods of teaching in order to engage today's college students. Finally, the faculty respondents in this study perceive that when students are immersed in the learning process (such as provided in virtual world environments), students achieve higher intrinsic rewards, thus greater self-efficacy (agreeing with Duncan, 2005; Lumpe & Chambers, 2001; Pajares, 1992; and Straub, 2009). In reference to Duncan's (2005) study, the participants in the study felt that the more they were immersed in the learning process, the higher the intrinsic rewards and therefore increased self-efficacy.

Research Question 4: What are faculty perceptions of the challenges of using virtual world technology in the classroom?

Accessibility to the appropriate hardware and software in order to use virtual world technology in the classroom is the central perceived challenge, according to the findings in both the survey and interviews. The accessibility issue appears more of an issue with the faculty who were interviewed than the overall consensus of the survey responses. By far, the accessibility (availability of the hardware and/or software necessary to use virtual world technology) issue was the challenge that was discussed the most by the faculty interviewed. Perhaps the contradiction between the survey and interview responses is due to the fact that the interviewees could give a detailed account of their perceptions (which the survey did not allow). Perhaps the interviewees had

previous experiences with their information technology (IT) departments that influenced faculty perceptions on the availability of the hardware and/or software needed to use virtual world technology in the classroom. Many of the interviewees perceived that their IT departments would not allow the software to be loaded on the computers in the colleges. The accessibility issue is also evident in the literature reviewed for this study (Albright, 1996; Rogers, 2000).

The faculty perceive the lack of training in virtual world technology as a challenge in using the technology in the classroom. Faculty feel that faculty development opportunities need to be offered in order for faculty to have the confidence necessary to use the technology in the classroom. The interviewees felt that they perhaps did not have the time to learn virtual world technology, but the survey respondents disagreed. In general, the faculty agreed that they would welcome faculty development opportunities in learning how to incorporate virtual world technology in the classroom. This agreement demonstrates that even though faculty perceive the lack of faculty development in virtual world technology as a challenge, the faculty are willing to undergo training on how to use the technology. The faculty development theme is also evident in the literature reviewed for this study (Adams, 2002; Christensen, 2002; Duncan, 2005; Jacobsen, 1997; Lumpe & Chambers, 2001; Rodriguez & Knuth, 2000; and Rogers, 2000).

Implications

This study was designed to gain insights into faculty perception on using virtual world technology in the higher education classroom. The sample studied were design college faculty who teach students that major in applied arts programs, such as animation, audio production, web design, graphic design, motion graphics, game design, game

programming, video production, and photography. Even though all of the faculty participating in this study may not teach subjects that historically are technology-driven or interactive in nature, these design college faculty all teach students who are majoring in technology-driven, interactive programs. These students may be inclined to gravitate to immersive, engaging, and interactive technologies such as virtual world technology (Coffman & Klinger, 2007; Duncan, 2005; Hodge, Tabrizi, Farwell, & Wuensch, 2007; Mullen, Beilke, & Brooks, 2007; and Steinkuehler & Duncan, 2008).

The students of the participating design colleges have been raised in an interactive, video-gaming world. These are technology savvy, digital natives who are used to instant everything (Hodge, et. al., 2007). These students chose to attend the design college so that they can major in an applied arts field. They do not go to a design college to major in a liberal arts-type subject, such as philosophy or physics. Nevertheless, since the students in the design colleges are earning either a bachelor's or an associate's degree from an accredited higher education institution, general education courses are a requirement of the degree. In order to engage a student who possibly might not be interested in a particular subject (such as physics), perhaps incorporating interactive virtual environments as a learning delivery method can possibly stimulate students who may otherwise be bored with the subject matter.

This study surveyed and interviewed design college faculty to gain insights into faculty perceptions about using virtual worlds in the classroom. If design college faculty, who teach students who are majoring in technology-driven, interactive-type programs are not embracive of virtual world technology, it is reasonable to suppose that faculty from traditional higher education institutions, such as state colleges or universities, perhaps

will not be embracive of the technology either. The significance of this study is the consensus that virtual world technology is a useful teaching tool that can engage students in the learning, create an interactive environment, and encourage collaboration between students in a learning environment. Therefore, in reviewing the data in the study (both the survey data and the interview data) the perceived affordances of adopting virtual world technology in the higher education design college classroom as a teaching tool appear to outweigh the perceived barriers in this study.

However, it is important to note, that even though it appears that the faculty who participated in this study, in general, perceive that virtual world technology has the potential to be a useful teaching tool in the higher education classroom, the faculty also perceive that they do not have the essential software and hardware support from their colleges to adopt this type of technology as a teaching tool in their courses. Furthermore, this study demonstrates that faculty perceive the barriers to adopting virtual world technology in today's higher education classroom as the same type of barriers that Albright (1996), Beggs (2000), and Rogers (2000) cited in their research. Even though instructional technology was different 14 years ago, the faculty in 1996 (and in 2000) cited accessibility issues and institutional support as perceived barriers to adopting technology at the time (Albright, 1996; Beggs, 2000; Rogers, 2000). My study illustrates that perhaps the issue regarding the adoption of virtual world technology as a teaching tool in the higher education classroom is not a matter of whether the faculty teaching are willing to adopt the technology, but rather are they able to adopt the technology due to accessibility issues that their IT departments impose?

Based on this study, there is a call for the design colleges to address the perceived problem of not being able to meet the technology needs of the faculty. There is an overall perception that the IT departments in the colleges are not willing to meet the technology needs of the faculty teaching. In order to adopt new technologies in the classroom (such as virtual world technology), faculty need to feel they have the support of both their IT department and their college. The perceived lack of accessibility to the hardware and software necessary to use virtual world technology in the classroom as a teaching tool may indeed only be a perception. However, with the faculty, this perception appears to be a reality, whether the lack of accessibility to the essential hardware and software is actually occurring in the colleges.

Limitations of Results

The limitations of this study could include the population of the study and/or the scale used in the survey instrument. Since the colleges used in this study were design colleges that perhaps tend to incorporate and use many different instructional technology methods in the classroom (such as interactive media), the results of the research may not represent or be generalizable to colleges that do not tend to incorporate many different technologies (including interactive media). In addition, the faculty who participated in this study may have been more inclined towards the adoption of technology since they volunteered for the survey. Likewise, the faculty who volunteered for the interviews and were then randomly purposefully selected for an interview may have been more inclined towards the adoption of technology, than those who chose not to be interviewed. The intent of the purposeful sampling of the interviewees was to interview faculty who represented the population of the sample. However, the purposeful sampling of the

interviewees may have resulted in faculty who really did not represent the sample as a whole. Furthermore, the faculty who volunteered for this study may have been more technology-savvy than the general population of faculty in non-design colleges.

Another possible limitation that may have affected the results of the study is the Likert-type scale used in the Virtual Worlds Faculty Survey. The Likert-type scale used was a five-point scale, which means the distribution of answers is discrete, allowing only five possibilities. The five-point Likert-type scale was chosen because I felt the participants might be more responsive and complete the survey by using the five-point scale rather than a nine-point scale, for example.

Directions for Future Research

Future research on the topic of integrating virtual world technology into the higher education classroom could possibly branch out to different venues or settings. These settings could include employing the survey instrument and post-survey interview questions to faculty in higher education institutions other than design colleges to determine if the perceptions between non-design college faculty and design college faculty correlate. Another possibility for future research could include studying the effect of faculty development opportunities on the outcomes of the perceptions of faculty using virtual world technology in the classroom as a teaching method. In addition, future research could focus on specific areas of opportunities revealed in the responses to the survey and interviews in this research study in regards to addressing faculty perceptions and concerns about using virtual worlds technology in the classroom. For example, the faculty surveyed and interviewed for this research study overall perceive that virtual world technology is a useful teaching tool, however, only 17.3% of the faculty surveyed

for this study have used a virtual world environment and only 10.9% have used a virtual world role playing game. Perhaps future research should include an in-depth study into why faculty perceive a technology as a “useful teaching tool” (such as virtual world technology) but do not actually adopt the “useful teaching tool” in the classroom as a teaching method. Furthermore, future research could include case studies that could be performed on faculty who decide to adopt virtual worlds technology in the classroom to ascertain if those faculty perceive a difference on student learning outcomes over using their previous teaching methods. Finally, future research should continue to study the barriers that faculty perceive to be instrumental in determining whether they are able to adopt a technology (such as virtual world technology) into their teaching.

References

Adams, N. B. (2002). Educational Computing Concerns of Postsecondary Faculty. *Journal of Research on Technology*, 34(3), 285 – 303.

Adams, N. B. (2007). Toward a Model for Knowledge Development in Virtual Environments: Strategies for Student Ownership. *International Journal of Sciences*, 2(2), 71 - 77.

Albright, M. (1996). *Instructional technology and higher education: Rewards, rights and responsibilities.* Keynote Address at the Southern Regional Faculty and Instructional Development Consortium. Baton Rouge, LA. (ERIC Document Reproduction Service No. ED 392 412).

Anderson, S.E. (1997). Understanding Teacher Change: Revisiting the Concerns Based Adoption Model. *Curriculum Inquiry*, 27(3), 331 – 367.

Anglin, G.J. (1995). *Instructional Technology, second edition*. Englewood, CO: Libraries Unlimited.

Appel, J. (2006). Second Life Develops Education Following: Virtual world being used by some educators and youth groups for teaching. [Online]. Retrieved April 5, 2009, from http://www.eschoolnews.com/news/top-news/index.cfm?i=42030&CFID=8638975&CFTOKEN=21337481

Armstrong, D. M. (1993). *A Materialist Theory of the Mind*. New York, NY: Routledge.

Au, W. J. (2008). *The Making of Second Life: Notes from the New World.* New York, NY: HarperCollins.

Baker, P. J. & Zey-Ferrell, M. (1984). Local and Cosmopolitan Orientations for Faculty: Implications for Teaching. *Teaching Sociology*, 12(1), Recognizing and Rewarding Teaching, 82 – 106.

Bandura, A. (1977). *Social Learning Theory*. Englewood Cliffs, NJ: Prentice Hall.

Barab, S. A., Hay, K. E., Barnett, M., & Squire, K. (2001). Constructing Virtual Worlds: Tracing the Historical Development of Learner Practices. *Cognition and Instruction,* 19(1), 47 - 94. Retrieved February 11, 2009, from http://www.jstor.org

Beggs, T.A. (2000). *Influences and Barriers to the Adoption of Instructional Technology*. [Online]. Retrieved August 30, 2009, from http://frank.mtsu.edu/~itconf/proceed00/beggs/beggs.htm

Berner, M., O'Sullivan, e. & Rassel, G. (2003). *Research Methods for Public Administrators*. New York: Addison Wesley Longman.

Bluman, A. G., (2007). *Elementary Statistics: A Step by Step Approach.* New York, NY: McGraw-Hill.

Bricken, M. (1991). Virtual Worlds: No Interface to Design. Retrieved March 25, 2010 from http://www.hitl.washington.edu/publications/papers/interface.html

Brookfield, S. (1990). *The Skillful Teacher*. San Francisco, CA: Jossey-Bass.

Christensen, R. (2002). Effects of Technology Integration Education on the Attitudes of Teachers and Students. *Journal of Research on Technology in Education*, 34(4), 411-434.

Coffman, T. & Klinger, M. B. (2007). Utilizing Virtual Worlds in Education: The Implications for Practice. *International Journal of Sciences*, 2(1), 29 - 33.

Cook, C. Heath, F., & Thompson, R. L. (2000). A Meta-Analysis of Response Rates in Web or Internet-Based Surveys. *Educational and Psychological Measurement*, 60, 821-836. doi: 10:1177/00131640021970934

Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* Thousand Oaks, CA: Sage Publications.

Creswell, J. W. & Plano Clark, V. L. (2007). *Designing and Conducting Mixed Methods Research*. Thousand Oaks, CA: Sage Publications.

Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. New York, NY: Harper Perennial.

Dall'Alba, G., & Sandberg, J. (2006). Unveiling professional development: A critical review of stage models. *Review of Educational Research*, 76, 383-412.

Darnton, R. (1984). The Great Cat Massacre and Other Episodes in French Cultural History. New York, NY: Vintage Books.

Dede, C. (2004). *Distributed-learning communities as a model for educating teachers*. Paper presented at the Society for Information Technology and Teacher Education (SITTE), Atlanta, GA.

Dolnicar, S. & Grun, B. (2007). Assessing analytical robustness in cross-cultural comparisons. *International Journal of Culture, Tourism, and Hospitality Research*, 1(2), 140-160. DOI:10.1108/17506180710751687

Driscoll, M.P. (2002). How People Learn (and What Technology Might Have to Do With It). *ERIC Clearinghouse on Information Technology, Syracuse, NY*. Report No: EDO-IR-2002-05.

Duncan, H. (2005). On-line Education for Practicing Professionals: A Case Study. *Canadian Journal of Education / Revue canadienne de l'éducation,* 28(4) 874-896. Retrieved February 11, 2009, from http://www.jstor.org

Ertmer, P.A. (2005). Teacher Pedagogical Beliefs: The Final Frontier in Our Quest for Technology Integration? *Educational Technology Research and Development*, 55(4), 25–39.

Fowler, F. J. (2009). *Survey Research Methods*. Thousand Oaks, CA: Sage Publications.

Fridah, M. W. (N.D.) *Sampling in Research* [Online]. Retrieved March 19, 2010, from http://www.socialresearchmethods.net/tutorial/Mugo/tutorial.htm

Fuller, F.F. (1969). Concerns of Teachers: A Developmental Conceptualization. *American Educational Research Journal*, 6(2), 207-226.

Gibson, J.J. (1977). *The theory of affordances*. In R. Shaw & J. Bransford (eds.), Perceiving, Acting and Knowing. Hillsdale, NJ: Erlbaum.

Grayson, K. (2008). *Waiting It Out*. Campus Technology [Online]. Retrieved October 9, 2009, from http://campustechnology.com/articles/2008/10/waiting-it-out.aspx

Grbich, C. (2009). *Qualitative Data Analysis: An Introduction*. London: SAGE Publications.

Grenier-Winther, J. (1999, Dec.). Real Issues in the Virtual Classroom. *The French Review*, 73 (2), 252–264.

Hartman, J.M., Forsen, J.W., Wallace, M.S., Neely, J.G. (2002). Tutorials in clinical research: Part IV: Recognizing and Controlling Bias. *The Laryngoscope*, 112, 23-31.

Hodge, E. M., Tabrizi, M. H. N., Farwell, M. A., & Wuensch, K. L. (2007). Virtual Reality Classrooms Strategies for Creating a Social Presence. *International Journal of Sciences*, 2(1), 105-109.

Huck, S. W. (2008). *Reading Statistics and Research, 5th Edition*. New York: Pearson Education.

Inoue, Y. (2007). Concepts, Applications, and Research of Virtual Reality Learning Environments. *International Journal of Sciences*, 2(1), 1-7.

Jacobsen, M. (1997). Bridging the Gap between Early Adopters' and Mainstream Faculty's Use of Instructional Technology. [Online]. *Information Analysis*. Retrieved April 5, 2009, from http://eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/16/ed/23.pdf

Johnson, R.B.& Onwuegbuzie, A.J. (2004). *Mixed Methods Research: A Research Paradigm Whose Time Has Come.* Retrieved October 1, 2009, from http://www.aera.net/uploadedFiles/...Researcher/.../03ERv33n7_Johnson.pdf

Johnson, M. J., Schwab, R. L., & Foa, L. (1999). Technology as a Change Agent for the Teaching Process. *Theory into Practice*, 38(1), Redefining Teacher Quality, 24–30.

Jonassen, D.H. (1996). *Handbook of Research on Educational Communications and Technology: A Project of the Association for Educational Communications and Technology*, *second edition*. Mahwah, NJ: Lawrence Erlbaum Associates.

Jones, M.G. (n.d.). *Defining Educational Technology for Classroom Learning*. [Online]. Retrieved October 10, 2009 from http://coe.winthrop.edu/educ602/rolo/

Jones, M.G., Harmon, S.W. & O'Grady-Jones, M.K. (2005). Developing the Digital Mind: Challenges and Solutions in Teaching and Learning. *Teacher Education Journal of South Carolina, 2004-2005*; 17–24.

King, K. P. (2005). *Bringing Transformative Learning to Life*. Marabar, FL: Krieger Publishing.

Kluge, S. & Riley, L. (2008). Teaching in Virtual Worlds: Opportunities and Challenges. *Issues in Informing Science and Information Technology*, 5, 127–135.

Kumar, N., Rose, R. C., & D'Silva, J. L. (2008). Teachers' Readiness to Use Technology in the Classroom: An Empirical Study. *European Journal of Scientific Research*, 21(4), 603-616.

Lagerspetz, O. (2008). Studying Perception. *Philosophy*, 83(2), 193-211. Retrieved July 25, 2010, from Research Library. (Document ID: 1609381131).

Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic Inquiry*. Beverly Hills, CA: Sage.

Luft, J. A. & Roehrig, G. H. (2007). Capturing Science Teachers' Epistemological Beliefs: The Development of the Teacher Beliefs Interview. *Electronic Journal of Science Education*, 11(2), 38 – 63.

Lumpe, A. T. & Chambers E. (2001) Assessing Teachers' Context Beliefs about Technology Use. *Journal of Research on Technology in Education*, 34(1), 93-107.

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in Adulthood, A Comprehensive Guide*. San Francisco, CA: Jossey-Bass.

Minium, E.W., Clarke, R.C., & Coladarci, T. (1999). *Elements of Statistical Reasoning.* Hoboken, NJ: Wiley & Sons.

Moser, F. Z. (2007). Faculty Adoption of Educational Technology. *Educase Quarterly*, 1, 66 – 69.

Moser, P. K. (1986). Perception and Belief: A Regress problem. *Philosophy of Science*, 53(1), 120-126.

Mullen, L., Beilke, J., & Brooks, N. (2007). Redefining Field Experiences: Virtual Environments in Teacher Education. *International Journal of Social Sciences*, 2(1), 22 – 28.

Musto, D. & Konolige, K. (1993). Reasoning about perception. *AAAI Technical Report* [Online]. Retrieved July 22, 2010, from http://www.aaai.org

Nicolle, P. S. (2005). *Technology Adoption into Teaching and Learning by Mainstream University Faculty: A Mixed Methodology Study Revealing the 'How, When, Why, and Why Not.'* (Doctoral dissertation, Louisiana State University). Retrieved from http://etd.lsu.edu/docs/available/etd-07112005-163713/

Norman, D.A. (1988). *The Design of Everyday Things*. New York, NY: Basic Books.

Novek, E. M. (1996). *Do professors dream of electric sheep? Academic anxiety about the information age*. Paper presented at the Annual Meeting of the Association for Education in Journalism and Mass Communication, 79, Anaheim, CA. (ERIC Document Reproduction Service No. ED 399 594).

Onwuegbuzie, A.J. & Leech, N.L. (2007). A Call for Qualitative Power Analyses. *Quality & Quantity*, 41, 105-121. DOI:10.1007/s11135-005-1098-1

O'Sullivan, E., Rassel, G. R., & Berner, M. (2003). *Research Methods for Public Administrators.* New York, NY: Addison, Wesley, Longman.

Pajares, M.F. (1992). Teachers' Beliefs and Educational Research: Cleaning Up a Messy Construct. *Review of Educational Research*, 62(3), 307–332.

Pervin, L. A. (1967, June). The College as a Social System: A Fresh Look at Three Critical Problems in Higher Education. *The Journal of Higher Education*, 38(6), 317–322.

Prensky, M. (2001). Digital Natives, Digital Immigrants. [Online]. *On the Horizon*, MCB University Press, 9(5). Retrieved April 10, 2009, from www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf

Pursel, B. K. & Bailey, K. D. (2007). Establishing Virtual Learning Worlds: The Impact of Virtual Worlds and Online Gaming on Education and Training. [Online]. Retrieved August 25, 2009, from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.121.1959&rep=rep1&type=pdf

Reisner, R.A. & Dempsey, J.V. (2007). *Trends and Issues in Instructional Design and Technology, second edition*. Upper Saddle River, NJ: Pearson Education.

Riegle, R. P. & Matejka, W. A. (2005). Dying to Learn: Instructional Design and MMORPGs. [Online]. Retrieved April 10, 2009, from http://www.uwex.edu/disted/conference/Resource_library/search_fullresults.cfm

Riegle, R. P. & Matejka, W. A. (2006). *The Learning Guild: MMORPGs as Educational Environments*. Annual Conference on Distance Teaching & Learning.

Rikhye, R., Cook, S. & Berge, Z. L. (2009). *Digital Natives vs. Digital Immigrants: Myth or Reality*. [Online]. Retrieved January 20, 2010 from http://www.itdl.org/Journal/Feb_09/article01.htm

Rodeghier, M. (1996). Surveys with Confidence: A Practical Guide to Survey Research Using SPSS. Chicago, IL: SPSS.

Rodriguez, G. & Knuth, R. (2000). *Critical Issue: Providing Professional Development for Effective Technology Use* [Online]. Retrieved April 5, 2009, from http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te1000.htm

Rogers, E. M. (2003). *Diffusion of Innovations*. New Your, NY: Free Press.

Rogers, P. L. (2000). Barriers to Adopting Emerging Technologies in Education. *Journal of Educational Computing Research*, 22(4), 455–472.

Rubin, H.J. & Rubin, I.S. (2005). *Qualitative Interviewing: The Art of Hearing Data*, Second Edition. Thousand Oaks, CA. Sage Publications.

Saettler, P. (1990). *The Evolution of American Educational Technology*. Englewood, CO: Libraries Unlimited.

Sax, L.J, Gilmartin, S.K. & Bryant, A.N. (2003). Assessing Response Rates and Nonresponse Bias in Web and Paper Surveys. *Research in Higher Education*, 44(4), 409-432.

Schram, T. H. (2006). Conceptualizing and Proposing Qualitative Research (Second Edition). Columbus, OH: Pearson Education.

Smith, P. L. & Ragan, T. J. (1999). *Instructional Design*, second edition. New York, NY: Wiley & Sons.

Smith, P. L. & Ragan, T. J. (2003). *Instructional Design*, third edition. New York, NY: Wiley & Sons.

Stafford, D. (2005, November). *Educating the Video-Game Generation*. [Online]. Retrieved April 10, 2009, from http://www.naesp.org/ContentLoad.do?contentId=1775

Steinkuehler, C., Duncan, S. , & Duncan, S. (2008). Scientific Habits of Mind in Virtual Worlds. *Journal of Science Education & Technology*, 17(6), 530-543.

Stemler, Steve (2001). An overview of content analysis. *Practical Assessment, Research & Evaluation*, 7(17). Retrieved September 28, 2010 from http://PAREonline.net/getvn.asp?v=7&n=17

Steuer, J. (1992). Defining Virtual Reality: Dimensions Determining Telepresence. *Journal of Communication*, (4), 73-93.

Straub, E. T. (2009). Understanding Technology Adoption: Theory and Future Directions for Informal Learning. *Review of Educational Research*, 79(2), 625-649.

Stuckart, D., & Glanz, J. (2007, December). What Dewey Can Still Teach Us. *Principal Leadership*, 8(4), 16-21. Retrieved April 25, 2010, from Research Library. (Document ID: 1398283781).

Sugar, W. C., Crawley, F. & Fine, B. (2004). Examining teachers' Decisions to Adopt New Technology. *Educational Technology and Society*, 7(4), 201–213.

Tezbasaran, A. (1997). *Validity of a Likert Type Scale (A Case Study)*. [Online]. Retrieved November 2, 2009, from http://www.efdergi.hacettepe.edu.tr/199713A%20ATA%20TEZBA%C5%9EARAN.pdf

Thomas, D. & Brown, J. S. (2009, January*). Why Virtual Worlds Can Matter*. International Journal of Media and Learning, 1(1).

"*Training Surgeons From The Video Game Generation - Study To See If Using Computer Animation Can Make Young Surgeons Better*" (N.A.). (2008, June 22). [Online]. Retrieved February 1, 2009, from http://www.medicalnewstoday.com/articles/113169.php

Thomas, D. R. (2006). A general inductive approach for qualitative data analysis. *American Journal of Evaluation*, 27(2), 237 – 246.

Vision, G. (2009). Fixing Perceptual Belief. *The Philosophical Quarterly*, 59(235), 292-314.

Wang, K. Y. and Gloviczki, P. J., (2008, November). *Sense of Community in the Virtual World: An Ethnographic Exploration of Online Memorial Groups*. Paper presented at the annual meeting of the NCA 94th Annual Convention, San Diego, CA [Online]. Retrieved April 10, 2009, from http://www.allacademic.com/meta/p256768_index.html

Weber, M. (2002). *The Protestant Ethic and the "Spirit" of Capitalism and Other Writings*. New York, NY: Penguin Group.

Windschitl, M. & Sahl, K. (2002). Tracing Teachers' Use of Technology in a Laptop Computer School: The Interplay of Teacher Beliefs, Social Dynamics, and Institutional Culture. *American Educational Research Journal*, 39(1), 165-205.

APPENDIXES

APPENDIX A

Virtual Worlds Faculty Survey Email Recruitment Letter

Virtual Worlds Faculty Survey – Call for Volunteers

Dear Colleagues,

I am conducting a Virtual Worlds Faculty Survey to obtain higher education faculty perceptions on using virtual world technology in the classroom. In this survey, virtual world technology includes software-based applications that simulate an environment. The virtual world environment is considered a 3-D graphical representation of the real world, created by users of the virtual world (Au, 2008). In essence, "in a virtual world, we are inside an environment of pure information that we can see, hear, and touch. The technology itself is invisible, and carefully adapted to human activity so that we can behave naturally in this artificial world. We can create any imaginable environment and we can experience entirely new perspectives and capabilities within it" (Bricken, 1991, p. 1). For a more detailed description of virtual world technology, click on this link: http://www.lindawwood.com/vwtdescription.html

Purpose: The purpose of this research is to study higher education faculty perceptions of virtual world technology in the classroom as either a supplemental or an alternative method of instruction. My research question: What are the perceptions of higher education design school faculty regarding the use of virtual world technology in their courses?

Participation in the study: You have been selected to voluntarily contribute to this research study by completing an online survey. As a higher education design school faculty member, your participation is invaluable since you contribute daily to the educational development of college students.

If you agree to participate in the survey, you will be asked 50 questions administered through an online survey. All questions involve checking a box, clicking a radio button next to the response desired, or writing in a text box to respond. It takes approximately 10 minutes to complete the online survey. Your responses will be handled in a confidential manner with no names associated with the data collected. You will only be able to take the survey once. You will not be identified personally.

How to participate: Clicking on the link at the end of this email will bring you to a consent page with an additional link to the body of the survey. You may return to previous screens at any time during the survey. At the end of the survey, you have the option of voluntarily submitting your email address for me to contact you for a possible telephone interview on the research subject.

Thank you very much for your extremely valuable contribution to my research study. I appreciate your time and effort.

Linda W. Wood
Ph.D. Candidate in Instructional Technology, Georgia State University
[redacted]

Link to the Virtual Worlds Faculty Survey: http://www.lindawwood.com

If you have questions or concerns about your rights as a participant in this research study, you may contact Susan Vogtner in the Office of Research Integrity at Georgia State University at 404.413.3513 or svogtner1@gsu.edu

APPENDIX B

Faculty Perception Towards Virtual World Technology Survey

The purpose of this survey is to gather information about higher education faculty beliefs, perceptions, and attitudes towards using virtual world technology as a supplemental or alternative teaching method in the classroom. In this survey, virtual world technology includes software-based applications that simulate an environment. The virtual world environment is considered a 3-D graphical representation of the real world.

This survey will ask you questions about your attitudes, beliefs, and perceptions about technology adoption in general and then specifically about virtual world technology. The survey will take approximately 10 minutes to complete.

Thank you in advance for your participation in completing this survey. Your time and effort is greatly appreciated. Contact information: Linda W. Wood [redacted]

Please answer the following questions.

1. What is your gender?

☐ Male
☐ Female

2. What age group are you in?

☐ Under 30
☐ 30 - 39
☐ 40 - 49
☐ 50 - 59
☐ Over 59

3. What is your race?

☐ American Indian or Alaska Native
☐ Asian
☐ Black or African American
☐ Hispanic or Latino
☐ Native Hawaiian or Other Pacific Islander
☐ White
☐ Other – Please specify _____

4. Which social computing applications have you used? Please check all that you have used.

☐ Facebook

☐ MySpace
☐ Wiki
☐ Blogs
☐ Twitter
☐ Multi-User Virtual Environments (such as *Second Life*)
☐ Massively Multiplayer Online Role Playing Games (such as *World of Warcraft*)
☐ Other _____
☐ None

5. What courses do you typically teach? (Please give course names instead of course numbers).

6. In what city is your college located?

7. How many years have you been teaching in higher education?
☐ Under 1 year
☐ 1 – 5 years
☐ 6 – 10 years
☐ 11 – 15 years
☐ 16 – 20 years
☐ Over 20 years

8. Do you teach or have you taught online distance education classes?
☐ Yes
☐ No

For the following questions, please check the box that relates to your attitude about each statement using the rating scale below each question. Some questions will be about your attitude toward technology in general. Other questions will be specifically about your attitude toward virtual world technology.

1= Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

		1	2	3	4	5
9.	Technology integration into teaching and learning is very important for my students					
10.	Effective technology integration can be a positive change agent in student learning within my discipline.					
11.	My teaching philosophy reflects that students learn most effectively through teacher-student interaction.					
12.	My teaching philosophy reflects that students learn most effectively when provided opportunities to interact with content and construct their own learning.					
13.	I do not have enough personal technology skills to integrate virtual world technology into teaching.					

1= Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

		1	2	3	4	5
14.	Technology integration into teaching and learning requires too much of my class preparation time.					
15.	I do not tend to adopt new technologies as they are introduced.					
16.	My college does not provide enough professional development opportunities that target the use of technology in instruction.					
17.	There is little or no administrative support for the integration of technology into teaching and learning.					
18.	I do not know how to incorporate virtual world technology in my course(s).					
19.	I feel that my teaching methods do not need to change to adapt to new technologies.					
20.	I see technology in teaching as a welcome challenge.					
21.	Technology integration benefits my students.					
22.	When I learn new technology skills and strategies, I have more confidence in my teaching.					
23.	Through my past and present use of technological tools, I am better able to tailor students' work to their individual needs.					
24.	Through the use of technological tools, I may spend more time preparing materials and resources for instruction.					
25.	Through the use of technological tools, my students can work in an environment, which appeals to a variety of learning styles.					
26.	I have no goals for integrating technology in my teaching.					
27.	Institution-provided / funded workshops / seminars are very important to me as a source of information concerning integrating technology in my teaching.					
28.	I would like to participate more in technical or technology integration faculty development opportunities.					
29.	An informal network of friends/colleagues is very important to me as a source of information concerning integrating technology in my teaching.					
30.	If additional incentives were offered, I would more likely participate in technology integration faculty development opportunities.					
31.	Using technology in teaching and learning has caused me to change my teaching style.					
32.	I use multimedia technology tools (e.g. audio, video, image editing) when preparing my course(s).					
33.	Technology use in my classroom encourages more student-centered learning.					
34.	Using virtual world technology in my course(s) will engage my students in the learning.					
35.	Using a virtual world assignment in my course(s) (either as an in-class activity or as a homework assignment) would engage my students in learning.					
36.	I do not have the time to learn how to incorporate virtual world technology in my course(s).					
37.	In a virtual world educational environment, students can learn by constructing their own knowledge as they explore the virtual world (as in constructivist learning).					

1= Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

		1	2	3	4	5
38.	Using virtual world technology in my course(s) will help increase collaborative learning.					
39.	Using virtual world technology in my course(s) encourages student-centered learning.					
40.	Using virtual world technology in my course(s) as a teaching tool can promote an environment for the students where they discover knowledge as they experience and participate in activities (discovery learning).					
41.	I believe that students respond positively to an interactive learning environment, such as virtual worlds.					
42.	I believe that virtual world technology provides an immersive learning environment where the student can become engaged in the learning as they explore the virtual environment.					
43.	I believe if the students are immersed in the learning process they will achieve higher intrinsic rewards, thus greater self confidence (or self-efficacy).					
44.	I believe there are advantages to using virtual world technology in my course(s).					
45.	My students' attitude towards technology has an effect on my attitude towards technology.					
46.	Using virtual world technology in my course(s) is not appropriate for the subject(s) I teach.					
47.	I cannot depend on access to essential software (such as *Second Life* or other virtual environment software) in order to use virtual world technology in my course(s).					
48.	I cannot depend on access to essential hardware (such as a computer or Internet connection) in order to use virtual world technology in my course(s).					
49.	I am interested in learning how to incorporate virtual world technology into my course(s).					

50. Would you consider being interviewed for a brief follow-up interview for this survey? The interview should take approximately 15 minutes.

☐ Yes

☐ No

If you answered "Yes" to being interviewed for this research study, please enter your current email address. _____

Thank you for your participation in completing this survey. You have been extremely helpful in my research study and your time and effort is greatly appreciated.

*This survey was adapted from a survey instrument developed by Pamela Stone Nicolle (2005), in *The Process of Technology Adoption and Integration into Teaching and Learning by University Faculty*.

APPENDIX C

Virtual Worlds Faculty Survey Informed Consent

Georgia State University
Department of Middle-Secondary Education and Instructional Technology
Informed Consent

Title:	Survey of Higher Education Faculty Using Virtual World Technology in the Classroom
Principal Investigator:	Dr. Stephen Harmon Linda W. Wood, Student Investigator [redacted]
Sponsor:	Georgia State University

I. Purpose:

You are invited to participate in a research study. The purpose of the study is to investigate perceptions of design college faculty using virtual world technology as a method of teaching in the classroom. You are invited to participate because you are a faculty member of a design college. A total of up to 5,000 participants will be recruited for this study. Participation will require approximately 10 minutes of your time.

II. Procedures:

If you decide to participate, you will be asked to answer a total of 50 questions administered once through a Web-based survey. All questions involve checking a box, clicking a radio button next to the response desired, or writing in a text box to respond. It takes approximately 10 minutes to complete the online survey. Your responses will be handled in a confidential manner with no names associated with the data collected. You will only be able to take the survey once. You will not be identified personally.

III. Risks:

In this study, you will not have any more risks than you would in a normal day of life.

IV. Benefits:

Participation in this study may not benefit you personally. Overall, we hope to gain information about perceptions of higher education faculty in using virtual world technology in the classroom.

V. Voluntary Participation and Withdrawal:

Participation in research is voluntary. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you decide, you will not lose any benefits to which you are otherwise entitled.

VI. Confidentiality:

We will keep your records private to the extent allowed by law. Only Dr. Stephen Harmon, Linda Wood, and [redacted] will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, the Office for Human Research Protection (OHRP) and the sponsor). We will use pseudonym (a fake name) rather than your name on study records. The information you provide will be stored on Linda Wood's computer, which is a password and firewall-protected computer. Your name and other facts that might point to you will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally.

VII. Contact Persons:

Contact Dr. Stephen Harmon [redacted] or Linda W. Wood [redacted] if you have questions about this study. If you have questions or concerns about your rights as a participant in this research study, you may contact Susan Vogtner in the Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu.

VIII. Copy of Consent Form to Subject:

We will give you a copy of this consent form to keep.

If you are willing to volunteer for this research, please sign below.

_____

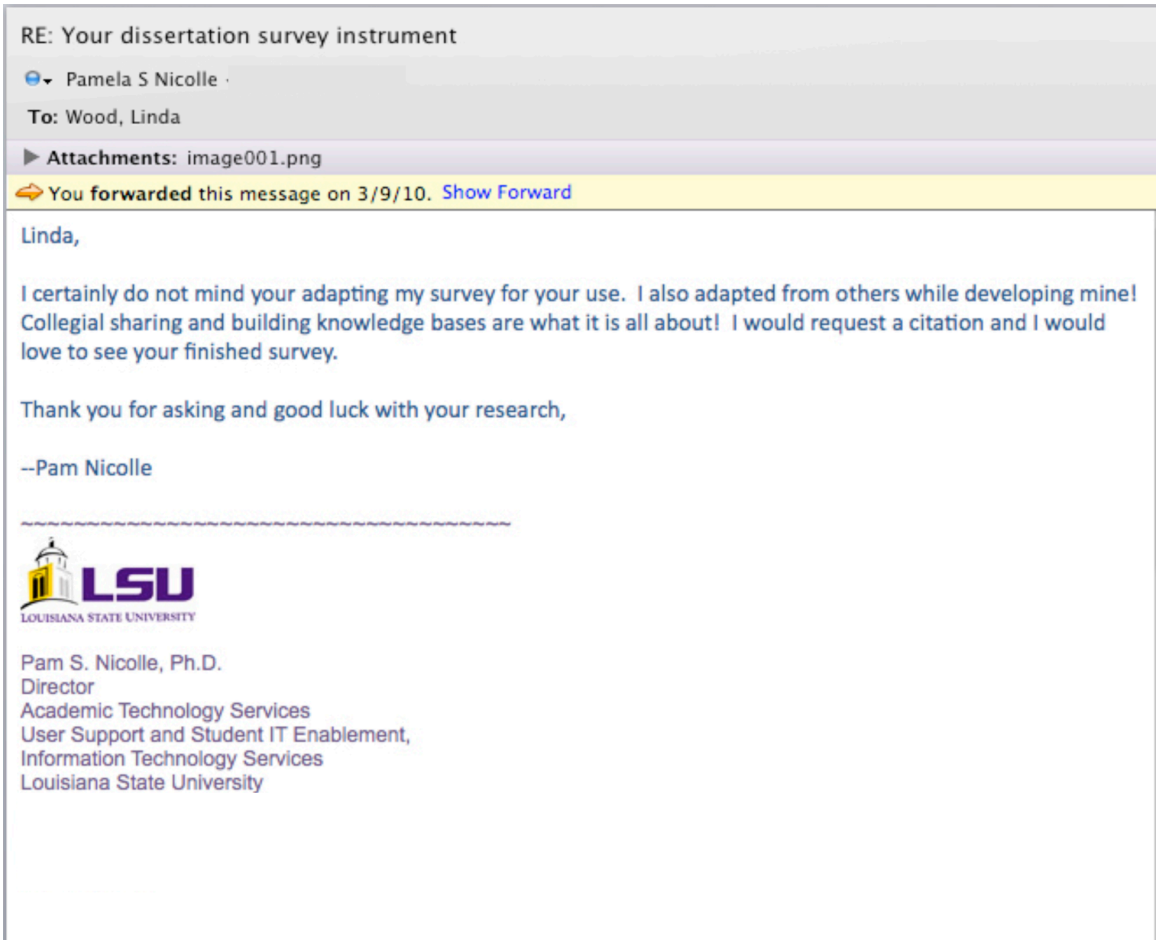
Participant Date

_____

Principal Investigator or Researcher Obtaining Consent Date

APPENDIX D

Nicolle (2005) Permission to Adapt Survey



RE: Your dissertation survey instrument

Pamela S Nicolle

To: Wood, Linda

Attachments: image001.png

You **forwarded** this message on 3/9/10. Show Forward

Linda,

I certainly do not mind your adapting my survey for your use. I also adapted from others while developing mine! Collegial sharing and building knowledge bases are what it is all about! I would request a citation and I would love to see your finished survey.

Thank you for asking and good luck with your research,

--Pam Nicolle

~~~~~~

LSU
LOUISIANA STATE UNIVERSITY

Pam S. Nicolle, Ph.D.
Director
Academic Technology Services
User Support and Student IT Enablement,
Information Technology Services
Louisiana State University
~~~~~~

APPENDIX E

Pilot Study

In order to explore faculty perceptions about incorporating virtual worlds technology into the classroom, a pilot study consisting of a series of Virtual Worlds Faculty Workshops was conducted at a design college located in a large metropolitan area in the southeast. The diverse student body of the design college consists of approximately 3,200 students with approximately 260 faculty members teaching at the college.

The Virtual Worlds Faculty Workshops were initially designed as a pilot study in order to explore faculty perceptions on using virtual world technology into the classroom by observing faculty reactions to the virtual world technology being introduced (in this case, *Second Life*). Higher education design college faculty members who teach face-to-face, blended, and/or online classes were the target audience for these pilot study workshops. The faculty could have potentially come from different higher education institutions, but the design college aforementioned was the primary source for higher education faculty participating in the workshops.

There was a possibility of 24 higher education design college faculty members participating in each workshop offered. The workshops were four hours long and offered once or twice per quarter. The participating faculty members hold terminal degrees in their subject field including: general education subjects, art foundations, advertising,

graphic design, illustration, interior design, animation, visual and game programming, photography, web design, culinary arts, video production, audio production, and visual effects and motion graphics. The participants for the Virtual Worlds Faculty Workshops were selected (first-come-first-serve) from responses to emails sent out to faculty about the workshops (see Appendix H). Choosing this approach perhaps enhanced the credibility to the pilot study due to the mixture of faculty participating in the study.

I have been the organizer and the leader of the Virtual Worlds Faculty Workshops and am the primary researcher. I have been trained in virtual world technology and have experience using the Multi-User Virtual Environment (MUVE), *Second Life*, which is the software application used in the workshops. There has been a non-participant trained observer (the secondary researcher) in the workshops documenting observations of the faculty participating. The same trained observer has assisted in conducting the post-workshop interviews of the faculty participants.

The participants received detailed information on how to create an account and an avatar prior to participating in the pilot study. An IRB was filed with Georgia State University prior to conducting the pilot study. An informed consent was given to each of the faculty participants at the workshop site, prior to participating in the workshop (see Appendix I). Pseudonyms (in this case, avatar names) were used instead of real names. A pre-workshop interview survey (see Appendix J) was administered to each participant once the informed consent was signed. The pre-workshop demographic survey and the post-workshop interview questions (see Appendix K) were used to test the potential survey questions in order to check for content validity, wording of the questions, and length of response to the questions. The final Virtual Worlds Faculty Survey used in this

research study reflects changes in wording of some of the questions as a result of the pre-workshop instrument review and post-workshop interviews (see Appendix B).

During the workshop, the faculty participating journaled their workshop experiences by submitting written entries and snapshots of their avatar in the virtual world environment on a Wiki, created specifically for the workshop. After each four-hour workshop was completed, the participating faculty were group interviewed (using an audio recording device) for their opinions regarding their beliefs about incorporating virtual world technology as a supplemental or alternative teaching method in the classroom. The pilot-study post-workshop interview questions can be found in Appendix K. The semi-structured interviews lasted approximately 30 minutes and took place immediately following the pilot-study workshops. The interview questions were open-ended and specifically addressed some of the questions in the theoretical framework. The audio interview recordings have been transcribed, peer reviewed by the secondary researcher, and member-checked by the interviewees. The semi-structured interviews were coded and interpreted. Post-survey interviews of faculty who later decide to adopt or reject virtual world technology as an alternative or supplemental teaching method into their classes could be potentially performed as a case study in the future.

Subsequent faculty workshops have been based on the previous workshops, incorporating any suggestions for improvements from participating faculty as well as addressing any gaps perceived by the workshop facilitator and/or the trained observer. Further data collection continued with subsequent faculty workshops held quarterly. The data collected from each of these faculty workshops include: demographic surveys, participant observations during the workshops, online journaling during and after the

workshops, and participant exit interviews. The data generated from these collection methods assist in interpreting faculty beliefs about incorporating virtual world technology into their classrooms.

Observing and interviewing faculty after being introduced to a workshop in incorporating virtual world technology into the classroom can potentially provide a look into faculty beliefs of adopting virtual world technology. As delineated earlier, post-survey interviews of faculty who later decide to adopt or reject virtual world technology as an alternative or supplemental teaching method into their classes could be potentially performed as a case study in the future. Schram (2006) states, "case study is defined by an analytic focus on an individual event, activity, episode, or other specific phenomenon" (p. 106), which can be interpreted to involve a single event, such as a study of observations, interviews, and journals of participants completing a workshop on a particular subject.

The pilot study described in this Appendix was used as an ancillary aspect of my research to provide me with first-hand insight to faculty reactions to the introduction of virtual world technology. Through observations, journaling, and interviews, the documented reactions of the participating pilot study faculty have assisted me in constructing and revising my survey and post-survey interview questions (after adapting the Nicolle, 2005, survey) to address my research questions. As noted, performing case studies (in future research) as a post-survey on faculty who decided to incorporate virtual world technologies into the classroom as a direct result of participating in the pilot study virtual worlds workshop could potentially be useful in determining whether virtual world technology makes a difference on student learning outcomes. Follow-up case studies on

the faculty who decide to adopt virtual world technology in the classroom can also assist in determining whether the perceived affordances of the technology outweigh the perceived barriers to adoption.

APPENDIX F

Virtual Worlds Faculty Survey
Adaptation and Justification of Survey Items

Virtual Worlds Faculty Survey	**Nicolle's (2005) Faculty Survey Instrument**	**Justification**
9. Technology integration into teaching and learning is very important for my students.	1e. Technology integration into teaching and learning is very important for my students.	Word for word.
10. Effective technology integration can be a positive change agent in student learning within my discipline.	1f. Effective technology integration can be a positive change agent in student learning within my discipline.	Word for word.
11. My teaching philosophy reflects that students learn most effectively through teacher-student interaction.	1h. My teaching philosophy reflects that students learn most effectively through teacher-student interaction.	Word for word.
12. My teaching philosophy reflects that students learn most effectively when provided opportunities to interact with content and construct their own learning.	1j. My teaching philosophy reflects that students learn most effectively when provided opportunities to interact with content and construct their own learning.	Word for word.
13. I do not have enough personal technology skills to integrate virtual world technology into teaching.	2a. I do not have enough personal technology skills to integrate technology into teaching.	Adapted to apply to virtual world technology (VWT).
14. Technology integration into teaching and learning requires too much of my class preparation time.	2d. Technology integration into teaching and learning requires too much of my class preparation time.	Word for word.
15. I do not tend to adopt new technologies as they are introduced.	Not included.	Reflects literature reviewed: Sugar, Crawley, & Fine (2004)
16. My college does not provide enough professional	2k. My university does not provide enough professional	Changed the word "university" to "college"

development opportunities that target the use of technology in instruction.	development opportunities that target the use of technology in instruction.	since the sample faculty teach in colleges, not universities.
17. There is little or no administrative support for the integration of technology into teaching and learning.	2l. There is little or no administrative support for the integration of technology into teaching and learning.	Word for word.
18. I do not know how to incorporate virtual world technology in my course(s).	2o. I lack essential knowledge of how to effectively integrate technology into instruction to benefit student learning.	Simplified and adapted to apply to virtual world technology.
19. I feel that my teaching methods do not need to change to adapt to new technologies.	4n. I have no goals for integrating technology in my teaching. 6a. I am satisfied with my current teaching style.	Reworded to reflect a combination of 4n and 6a, plus results from Virtual Worlds Faculty Workshop post-workshop interviews.
20. I see technology in teaching as a welcome challenge.	3c. I see technology in teaching as a welcome challenge.	Word for word.
21. Technology integration benefits my students.	3a. Technology integration benefits my students.	Word for word.
22. When I learn new technology skills and strategies, I have more confidence in my teaching.	Not included.	Reflects literature reviewed: Pajares (1992), Grenier-Winther (1999), Adams (2002), Straub (2009).
23. Through my past and present use of technological tools, I am better able to tailor students' work to their individual needs.	4c. Through my past and present use of technological tools, I am better able to tailor students' work to their individual needs.	Word for word.
24. Through the use of technological tools, I may spend more time preparing materials and resources for instruction.	4f. Through the use of technological tools, I may spend more time preparing materials and resources for instruction.	Word for word.
25. Through the use of technological tools, my students can work in an environment, which appeals to a variety of learning styles.	4l. Through the use of technological tools, my students can work in an environment, which appeals to a variety of learning styles.	Word for word.
26. I have no goals for integrating technology in my	4n. I have no goals for integrating technology in my	Word for word.

teaching.	teaching.	
27. Institution-provided / funded workshops / seminars are very important to me as a source of information concerning integrating technology in my teaching.	5k. Institution-provided / funded workshops / seminars are very important to me as a source of information concerning integrating technology in my teaching.	Word for word.
28. I would like to participate more in technical or technology integration faculty development opportunities.	Not included.	Faculty development opportunities cited as a reason faculty consider adopting new technologies is reflected in articles by Pajares (1992), Grenier-Winther (1999), Rodriguez & Knuth (2000), Adams (2002), Straub (2009). This question seeks a response for future faculty development opportunities.
29. An informal network of friends/colleagues is very important to me as a source of information concerning integrating technology in my teaching.	5i. An informal network of friends/colleagues is very important to me as a source of information concerning integrating technology in my teaching.	Word for word.
30. If additional incentives were offered, I would more likely participate in technology integration faculty development opportunities.	5e. I would participate more in technical or technology integration training with additional incentives offered.	Reworded based on literature review using the words "faculty development opportunities." Faculty development opportunities cited as a reason faculty consider adopting new technologies is reflected in articles by Pajares (1992), Grenier-Winther (1999), Rodriguez & Knuth (2000), Adams (2002), Straub (2009).
31. Using technology in teaching and learning has caused me to change my	6b. I have changed my teaching style due to the use of technology into teaching	Reworded due to feedback from survey pilot test group/

teaching style.	and learning.	
32. I use multimedia technology tools (e.g. audio, video, image editing) when preparing my course(s).	6f. I use multimedia technology tools (e.g. audio, video, image editing) when preparing my course.	Added the "(s)" after the word course to reflect the possibility that faculty surveyed might teach more than one course.
33. Technology use in my classroom encourages more student-centered learning.	7.2e. Technology use in my classroom encourages more student-centered learning.	Word for word.
34. Using virtual world technology in my course(s) will engage my students in the learning.	7.2e. Technology use in my classroom encourages more student-centered learning.	Virtual world adaptation of Nicolle's (2005) 7.2e.
35. Using a virtual world assignment in my course(s) (either as an in-class activity or as a homework assignment) would engage my students in learning.	Not included.	Question based on results of Virtual Worlds Faculty Workshop post-workshop interviews.
36. I do not have the time to learn how to incorporate virtual world technology in my course(s).	2d. Technology integration into teaching and learning requires too much of my class preparation time.	Virtual world technology (VWT) adaption of Nicolle's (2005) survey 2d. question to reflect VWT. In addition, question 36 reflects on literature reviewed for this study: Grenier-Winther (1999), Beggs, (2000), Ertmer (2005), Albright (2006).
37. In a virtual world educational environment, students can learn by constructing their own knowledge as they explore the virtual world (as in constructivist learning).	Based on: 1j. My teaching philosophy reflects my beliefs that students learn most effectively when provided opportunities to interact with content and construct their own learning.	Adapted to VWT and reflects literature review: Driscoll (2002), Riegle & Matejka (2005), Coffman & Klinger (2007), Kluge & Riley (2008).
38. Using virtual world technology in my course(s) will help increase collaborative learning.	4b. Through the use of technological tools, I expect an increased level of collaboration among my students.	Question adapted for VWT.
39. Using virtual world technology in my course(s) encourages student-centered learning.	7.2e. Technology use in my classroom encourages more student-centered learning.	Reworded and adapted for VWT. Reflects literature review: Inoue (2007)

40. Using virtual world technology in my course(s) as a teaching tool can promote an environment for the students where they discover knowledge as they experience and participate in activities (discovery learning).	Not included.	Reflects literature review: Adams (2007), Coffman & Klinger (2007), Kluge & Riley (2008), Wang & Gloviczki, (2008). In addition, question 40 reflects response results of Virtual Worlds Faculty Workshop post-workshop interviews.
41. I believe that students respond positively to an interactive learning environment, such as virtual worlds.	Not included.	Reflects literature review: Adams (2007), Coffman & Klinger (2007), Kluge & Riley (2008), Wang & Gloviczki, (2008). In addition, question 41 reflects response results of Virtual Worlds Faculty Workshop post-workshop interviews.
42. I believe that virtual world technology provides an immersive learning environment where the student can become engaged in the learning as they explore the virtual environment.	Not included but based on 8b: I believe that my use of technology in teaching had a positive effect on student learning.	Reflects literature review: Adams (2007), Coffman & Klinger (2007), Mullen, Mullen, Beilke, & Brooks (2007), Kluge & Riley (2008). In addition, question 42 reflects response results of Virtual Worlds Faculty Workshop post-workshop interviews.
43. I believe if the students are immersed in the learning process they will achieve higher intrinsic rewards, thus greater self confidence (or self-efficacy).	Not included.	Reflects literature review: Duncan (2005), Mullen, Mullen, Beilke, & Brooks (2007), Straub (2009).
44. I believe there are advantages to using virtual world technology in my course(s).	Not directly included but reflects the "Results" section from Nicolle's (2005) survey: questions 8a, 8b, 8c, 8d, 8e, 8f, 8g, 8h, 8i, 8j.	Question based on question asked in the Virtual Worlds Faculty Workshop post-workshop interviews: Appendix G, question 8, What advantages do you see to incorporating virtual world technologies into

		the higher education classroom?
45. My students' attitude towards technology has an effect on my attitude towards technology.	Not included.	Reflects literature reviewed for this study: Baker, Zay, & Ferrell (1984), Christenson (2002).
46. Using virtual world technology in my course(s) is not appropriate for the subject(s) I teach.	2n. The course I teach does not lend itself to technology integration.	Adapted for VWT.
47. I cannot depend on access to essential software (such as *Second Life* or other virtual environment software) in order to use virtual world technology in my course(s).	2i. I cannot depend on access to essential software.	Adapted for VWT.
48. I cannot depend on access to essential hardware (such as a computer or Internet connection) in order to use virtual world technology in my course(s).	2h. I cannot depend on access to essential hardware.	Adapted for VWT.
49. I am interested in learning how to incorporate virtual world technology into my course(s).	Not included.	Faculty development opportunities cited as a reason faculty consider adopting new technologies is reflected in articles by Pajares (1992), Grenier-Winther (1999), Rodriguez & Knuth (2000), Adams (2002), Straub (2009). This question seeks a response for future faculty development opportunities.

APPENDIX G

Virtual Worlds Faculty Survey Post-Survey Interview

Post-Survey Interview Questions

Virtual Worlds Faculty Survey

The post-survey semi-structured interviews for the Virtual Worlds Faculty Survey will be selected from the participants who volunteer for the post-survey interviews (by voluntarily providing their email address on the survey). The interviews will be held via telephone and audio recorded. The volunteers will be informed that their interview will be audio recorded.

The following questions will be asked:

1. Please explain your perception about using virtual world technology (such as *Second Life*) as a teaching tool in your course(s).

2. What do you see as the affordances of using virtual world technology in the higher education classroom?

3. What do you see as challenges of using virtual world technology in the higher education classroom?

APPENDIX H

Virtual World Faculty Workshop Pilot Study
Email Recruitment Letter

Virtual Worlds Faculty Workshop – Call for Volunteers

Dear Colleagues,

I am conducting a Virtual Worlds Faculty Workshop at your design college involving the introduction to using a Multi-User Virtual Environment (MUVE) in the classroom as an alternative method in delivering course content. Second Life, a MUVE, will be the software used in this workshop. You will be learning how to create an avatar, how to navigate in the environment, perform activities in the virtual environment, and learn how virtual environments, such as *Second Life*, can be incorporated into your face- to-face classes. This workshop will be conducted for 4 hours in one day.

Research Study Implications: This workshop will also involve a research study on faculty perception of using a MUVE in the classroom as an alternative method of instruction. Workshop and research study participation are strictly voluntary and you may at any time decide to withdraw from either or both without any repercussion. Research information received from the study is strictly confidential, with pseudonyms used instead of real names. An informed consent will be given to each participant who decides to participate in the research study. The volunteers will be interviewed as a group for approximately 20 minutes after the workshop is completed and will have the opportunity to voluntarily submit journal entries of their experience.

Purpose: The purpose of this research is to study higher education faculty perception of using a Multi-User Virtual Environment (MUVE) in the classroom as an alternative method in delivering course content. The research question: How do faculty feel about incorporating virtual worlds as a technology in the traditional face-to-face classroom? Hopefully the research will reveal whether the faculty will be willing to forgo their legacy teaching methods in order to engage the students in today's higher education classes.

Contact: Call Linda Wood at [redacted] if you would like to participate in the only the Virtual Worlds Faculty Workshop or would like to participate in both the Virtual Worlds Faculty Workshop and the research study involving the workshop. If you have questions or concerns about your rights as a participant in this

research study, you may contact Susan Vogtner in the Office of Research Integrity at Georgia State University at 404.413.3513 or svogtner1@gsu.edu.

APPENDIX I

VIRTUAL WORLDS FACULTY WORKSHOP INFORMED CONSENT

Georgia State University
Department of Middle-Secondary Education and Instructional Technology
Informed Consent

Title:	Evaluation of Higher Education Faculty Using Second Life
Principal Investigator:	Dr. Stephen Harmon Linda W. Wood, Student Investigator [redacted]
Sponsor:	Georgia State University

I. Purpose:

You are invited to participate in a research study. The purpose of this study is to evaluate the perceptions of higher education faculty using virtual world technology as a method of teaching in the classroom. You are invited to participate because you are a faculty member at a higher education institution. A total of up to 24 participants (up to 24 higher education faculty members) will be recruited for this research study. Participation will require a total of four and one-half hours.

II. Procedures:

If you decide to participate in this research study, the researchers will observe you as you participate in a virtual world workshop on a computer in a computer lab. You will be observed once. The virtual workshop will be held for four hours on one day. Two researchers will observe you during the workshop (the facilitator teaching the workshop and a trained observer who will be taking notes).

If you decide to participate in this research study, the researchers (one or both) will audio record an interview with you. The interview will be conducted at your design college as a group interview. The interview will last approximately 30 minutes. Participants will be interviewed as a group after the completion of the 4-hour workshop. Interviews will not be held during the instruction of the virtual workshop.

III. Risks:

Participating in this research study should pose no more risks than you would in a normal day teaching class.

IV. Benefits:

Participation in this research study may or may not benefit you personally. You will be given the chance to share your experience and perspectives with the research investigators. We hope to gain information about faculty perceptions of incorporating virtual world technology into higher education classrooms.

V. Voluntary Participation and Withdrawal:

Participation in this research study is voluntary. You do not have to participate in this study. If you decide to participate in the study and change your mind at any point, you have the right to drop out of the study. You may skip any portion of the virtual workshop, if you wish. You may skip any assignments or questions asked. You may stop participating at any time and there will be no repercussions for doing so. If you decide to withdraw from the study, you can still participate in the workshop without any observational data collected or without conducting a post-survey interview.

VI. Confidentiality:

We will keep your records private to the extent of the law. We will use a pseudonym (a fake name) rather than your real name on any study records. Only Dr. Harmon, Linda Wood, and [redacted] will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board and/or the Office for Human Resources, and the sponsor). The interviews will be digitally tape recorded and stored on Linda Wood's computer portable hard drive, which is password protected and locked in a file cabinet inside of a locked office. The journal entries will also be stored in Linda Wood's office in a locked file cabinet. The key to Linda Wood's office file cabinet is on her personal key ring. The audio recordings and transcribed interviews will be stored in a locking file cabinet in both researchers' home offices. The key to the open the researchers' home office file cabinets will be stored on their own personal key rings. Your name and any other identifying facts that might point to you will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally.

VII. Contact Persons:

Call Linda Wood at [redacted] if you have questions about this study. If you have questions or concerns about your rights as a participant in this research study, you may contact Susan Vogtner in the Office of Research Integrity at Georgia State University at 404.413.3513 or svogtner1@gsu.edu.

VIII. Copy of Consent Form to Subject:

We will give you a copy of this consent form to keep.

If you are willing to volunteer for this research study and be audio recorded, please sign below.

_____	_____
Participant	Date
_____	_____
Principal Investigator or Researcher Obtaining Consent	Date

APPENDIX J

Pre-Workshop Demographic Survey

Georgia State University
Department of Middle-Secondary Education and Instructional Technology
Virtual Worlds Faculty Workshop Survey

Title:	Evaluation of Higher Education Faculty Using Second Life
Principal Investigator:	Dr. Stephen Harmon Linda W. Wood, Student Investigator [redacted]
Sponsor:	Georgia State University

Please answer the following questions.

1. What is your gender?
   - ☐ Male
   - ☐ Female

2. What age group are you in?
   - ☐ 22 - 25
   - ☐ 26 - 30
   - ☐ 31 - 40
   - ☐ 41 – 50
   - ☐ 51 – 60
   - ☐ Over 60

3. What is your race?
   - ☐ American Indian or Alaska Native
   - ☐ Asian
   - ☐ Black or African American
   - ☐ Hispanic or Latino
   - ☐ Native Hawaiian or Other Pacific Islander
   - ☐ White
   - ☐ Other – Please specify _____

4. What are your social computing skills? Please check all that you have used.
   - ☐ Social Networks
   - ☐ Facebook
   - ☐ MySpace
   - ☐ Wiki
   - ☐ Blogs
   - ☐ MUVEs
   - ☐ MMORPGs

5. What is your Avatar name? _____

APPENDIX K

Post Workshop Interview Questions

Georgia State University
Department of Middle-Secondary Education and Instructional Technology
Interview Questions

Title:	Evaluation of Higher Education Faculty Using Second Life
Principal Investigator:	Dr. Stephen Harmon Linda W. Wood, Student Investigator [redacted]
Sponsor:	Georgia State University

1. What is your avatar name?
2. What department in the college are you in?
3. Please list the classes that you teach.
4. Please explain how you knew about virtual world environments prior to participating in this workshop.
5. What was your opinion about virtual world environments prior to participating in this workshop?
6. How did you feel navigating in Second Life after you were introduced to it during the workshop?
7. What were any difficulties using the Second Life environment that you experienced?
8. What advantages do you see to incorporating virtual world technologies into the higher education classroom?
9. What do you see as challenges for faculty using virtual world technology in the higher education classroom?

10. After participating in this virtual world workshop, do you anticipate using this technology in your classroom in the future? Why or why not?

11. After participating in this virtual world workshop, do you feel you would maintain your Second Life account and explore the environment further outside of the classroom environment (on your own)? Please explain.

APPENDIX L

Georgia State University
Department of Middle-Secondary Education and Instructional Technology

Title:	Informed Consent Higher Education Faculty Using Virtual World Technology in the Classroom – Post-Survey Interview
Principal Investigator:	Dr. Stephen Harmon Linda W. Wood, Student Investigator [redacted]
Sponsor:	Georgia State University

I. Purpose:

You are invited to participate in a research study. The purpose of the study is to investigate perceptions of design college faculty using virtual world technology as a method of teaching in the classroom. You are invited to participate because you provided your email address on the Virtual Worlds Faculty Survey indicating that you would agree to a brief post-survey interview. The interviewees are randomly selected from a purposeful sample of those who provided an email address in the Virtual Worlds Faculty Survey. A total of up to 20 participants will be interviewed for this study. Participation will require approximately 20 minutes of your time.

II. Procedures:

If you decide to participate, you will be asked to answer a total of three questions asked through a semi-structured telephone interview. If you decide to participate in this research study, the researchers (one or both) will audio record the interview with you. The interview will be conducted via telephone as an individual interview. The telephone interview will be audio recorded and transcribed. Your responses will be handled in a confidential manner with no names associated with the data collected. You will not be identified personally.

III. Risks:

In this study, you will not have any more risks than you would in a normal day of life.

IV. Benefits:

Participation in this study may not benefit you personally. Overall, we hope to gain information about perceptions of higher education faculty in using virtual world technology in the classroom.

V. Voluntary Participation and Withdrawal:

Participation in this research is voluntary. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you decide, you will not lose any benefits to which you are otherwise entitled.

VI. Confidentiality:

We will keep your records private to the extent allowed by law. Only Dr. Stephen Harmon, Linda Wood, and [redacted] will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, the Office for Human Research Protection (OHRP) and the sponsor). We will use pseudonym (a fake name) rather than your name on study records. The information you provide will be stored on Linda Wood's computer, which is a password and firewall-protected computer. The audio recordings and transcribed interviews will be stored in a locking file cabinet in both researchers' home offices. The key to the open the researchers' home office file cabinets will be stored on their own personal key rings. Your name and any other identifying facts that might point to you will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally.

VII. Contact Persons:

Contact Dr. Stephen Harmon [redacted] or Linda W. Wood [redacted] if you have questions about this study. If you have questions or concerns about your rights as a participant in this research study, you may contact Susan Vogtner in the Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu.

VIII. Copy of Consent Form to Subject:

You can print a copy of this consent form to keep for your records.

If you are willing to volunteer to being interviewed for this research, please email Linda Wood [redacted] to set up your telephone interview.