

FACTORS CONTRIBUTING TO THE ADOPTION OF VIRTUAL WORLDS BY
LIBRARIANS

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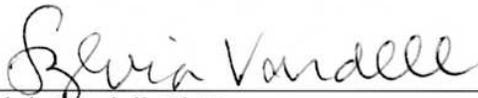
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I am submitting herewith a dissertation written by Valerie J. Hill entitled "Factors Contributing to the Adoption of Virtual Worlds by Librarians." I have examined this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy with a major in Library and Information Studies.

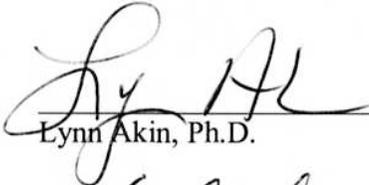


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ABSTRACT

VALERIE J. HILL

FACTORS CONTRIBUTING TO THE ADOPTION OF VIRTUAL WORLDS BY LIBRARIANS

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The purpose of this study was to examine factors that may or may not contribute to the adoption of the innovation of virtual worlds by librarians. Using Everett Rogers' Diffusion Theory as a framework, the study sought to identify librarians with avatars (computer simulated representations of themselves) in the virtual world of Second Life, specifically those with a rez date (date of creation of the avatar) prior to two years of the study. Research questions guiding the study were as follows:

1. What are the most influential of Rogers' five attributes of Diffusion Theory for librarians making the decision to adopt virtual worlds as a professional medium?
2. How are Rogers' five attributes of Diffusion Theory relevant to the adoption of virtual worlds when applied to the self-identified stage of adoption of librarians?

The methodology of this study was a survey which was based on the Community of Inquiry, or COI Model, a survey designed by Garrison, Anderson, and Archer, which uses a collaborative-constructivist approach to understanding the process of learning through a community. The survey was adapted to align with Rogers' 5 attributes.

Results of the study revealed a high perception of relative advantage and compatibility with librarianship, a good deal of observation of the innovation, but a lower perception of trialability and complexity. Findings may be useful for understanding factors of adoption, for documentation of the efforts of early adopting librarians, and will lead to a better understanding of the future of virtual world librarianship in an age of rapidly changing technology trends.

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CHAPTER I

INTRODUCTION

Background of the Problem

Computer games, alongside other emerging technologies, have changed information literacy and a new generation of learners now enters schools and libraries with new needs, new ideas of interacting with media, and new information-seeking behaviors. The term *literacy* has evolved over the past century and encompasses more than reading and writing (Virtual Inquiry 2011). Students learn to decode images, symbols, graphs, diagrams, artifacts and multi-media. New terms for literacy include information literacy, media literacy, digital literacy, and *transliteracy* (which encompasses the ability to comprehend and communicate across all formats) (Newman 2011). Most students have spent a good deal of time learning visual literacy through playing video games, which could be called a *semiotic domain* (Gee 2003, 13). Gee uses the term semiotic (representation through signs or symbols) domain in the context of using different modalities to communicate distinct types of meaning. While some people consider video games a waste of time, James Paul Gee argues that video games often present players with challenges that require critical thinking at high levels.

Over the past decade, video games have been designed with stories that evoke emotions similar to those readers encounter in literature. Students may identify with

characters and events in video games through vicarious experiences equivalent to reading literature or viewing films (Mastel & Huston 2009).

Writing and publishing have evolved simultaneously with changes in the intake of informational content (reading, viewing, and listening). Scott Gant, author of the book, "We're All Journalists Now" states, "As technology has transformed communications and become inexpensive and user-friendly, anyone can share his or her views with the world, putting them almost on the same playing field as traditional journalists (Lane 2011, 28).

Students entering universities, sometimes referred to as the "Google Generation", expect information to be at their fingertips and often believe all information is (or should be) "free." These young people have never known a world without the Internet and many are unaware of the costs of library-sponsored content (JISC 2008). Teaching literacy is challenging in an era when information is delivered in rapidly changing formats.

Students must analyze and evaluate content in all forms: physical print, audio-visual, digital and 3D virtual formats. Librarians and teachers must be familiar with new media formats and technology trends themselves in order to teach students critical inquiry, evaluation, and synthesis of knowledge.

Words describing new media trends in communication include *Transliteracy*, which is the ability to read, write, communicate, and interact across all platforms (Knowledgeworks Foundation 2010). Because we process information in many different formats simultaneously, particularly online, the process of comprehending incoming information encompasses more than one "literacy." The terms *media literacy* and *digital literacy* have been used to describe changing information processing skills of electronic

formats. However, new technological platforms have swiftly approached a global, cultural, economic, and social convergence (Thomas et al 2007).

Virtual worlds are one of the modes librarians and educators are investigating to determine how information will best be delivered in the future. Because virtual worlds allow users to collaborate synchronously, learners can blend physical reality and virtual reality into augmented reality (DeFreitas 2008).

Virtual worlds are one of the fastest growing modes of interaction on the web (Harris & Rea 2009). People interact across the globe through worlds such as Gaia or Habbo Hotel (popular with teens) or Webkinz (for the youngest users). By creating a virtual character to represent one's identity, called an *avatar*, individuals present themselves in a simulated context. Avatars may resemble the person, may be an animal, or some other creative object. Through task-based learning, educational concepts can be embedded in new pedagogical designs within serious virtual worlds (Bellotti et al 2010).

Gaming has become a popular buzzword in libraries, often touted as a way to lure patrons toward envisioning the library as a source for new media (Farmer 2010). Virtual worlds provide many of the advantages of video games and take them a step further by allowing users to create their own content both individually and through collaboration. The perception of the library as a center for new media may play a role in understanding best practices for meeting the changing information needs of library patrons. Virtual worlds are just one of the many innovative tools that information professionals can champion as leaders in the Information Age (Reid et al 2008).

A study designed by Davis & Smith (2009) compared library instruction in a virtual world setting with traditional classroom instruction in control groups, and found no significant difference. The study showed students entering universities are comfortable with online computer tools. Whether learning about library and information studies, or continuing professional development, librarians might utilize this new mode for collaborative learning.

An important point, made by Hinchcliffe from University of Illinois at Urbana-Champaign, is “If virtual worlds are the next thing that our students use day-to-day, is not it better to have some experience using it yourself now, when there may be 2,000 students who use, rather than to start after 20,000 students use it?” (Peterman & Grieg 2007, 28).

Understanding both the advantages and disadvantages of adopting the innovation of virtual worlds by librarians requires investigating the background of virtual worlds and what librarians have experienced during the early years of the medium. Identification of factors leading to the adoption of virtual worlds by librarians may provide important information to those seeking understanding of the benefits and limitations of using them for library services. Findings about factors contributing to the adoption of virtual worlds by librarians may play a role in solving the problem of identification of best practices for new media formats in the information age.

As this new generation of learners enters schools and libraries, more comfortable with a mouse than a pen, librarians are challenged with providing information in new formats for those born in the information age, which has been referred to as "digital

natives" for over a decade (Prensky 2001). Providing information to individuals who are comfortable in virtual environments, gaming platforms, and who embrace collaborative online learning can be problematic for librarians and educators coming from more traditional learning styles.

Librarians have always sought to acquire and deliver high quality educational resources. Because of the rapid increase in digital content over the last decade, the role of librarian has changed along with the mode and medium of delivery of informational resources. Keeping current on trends in information seeking behavior, media literacy, and information storage and retrieval has never before been as challenging to each individual. Building a personal learning network has become imperative to embracing technological change in the information age and collaboration with colleagues in a synchronous virtual space is one way to form this type of community (Peters 2008).

Keeping up with new media formats (becoming *transliterate*) is a problem for librarians which is twofold: (1) First, librarians face the problem of delivering resources in new modes that users are seeking and (2) librarians must find ways to share newly acquired technology trends and applications with each other as professional colleagues. Virtual worlds have potential to help librarians with both aspects of this problem. Librarians are collaborating in virtual worlds in great numbers, sharing knowledge and expertise in a constantly changing field (Bell et al 2008). Virtual worlds are an example of a new mode of information delivery which has been explored by librarians, particularly in Second Life (Kzero 2011).

During the years 2006-2011, the virtual world most widely recognized for educational use was Second Life (Kzero 2011). Librarians around the globe became active in Second Life during the period of rapid growth of implementation by colleges and universities (Bell et al 2008). One librarian shared information about the American Library Association opening an island on Second Life on a blog (Levine 2007). After creating an avatar in Second Life, exploring ALA Island and meeting librarians working in the virtual world, the researcher began collecting tools useful for education and information delivery (Hill & Lee 2009).

This dissertation examines the experiences of a small number of these collaborative librarians, utilizing the virtual world of Second Life for professional purposes, in order to identify and better understand attributes contributing to the adoption of the innovation of virtual worlds in librarianship.

Purpose of the Study

This study sought to examine factors contributing to the adoption of the innovation of virtual worlds by librarians during the rapidly changing era of the early 21st century. Participants in the study consisted of librarians with over two years of experience in the virtual world of Second Life. The researcher used a survey instrument, based on the Community of Inquiry survey (COI 2010), which embedded Diffusion Theory as a framework for identification of attributes of adoption.

Narrowing the focus of the study within the topics of new media and changing literacy formats required investigation of a variety of communication platforms,

including what is commonly referred to as Web 2.0 tools. Dictionary.com defines Web 2.0 as “the internet viewed as a medium in which interactive experience, in the form of blogs, wikis, forums, etc, plays a more important role than simply accessing information.” From the many communication tools under the Web 2.0 umbrella, virtual worlds were chosen as one important new trend to be investigated.

The study does not intend to fully cover many of the Web 2.0 tools and technological applications being used by librarians during the same time period. While no single individual can become an expert in all of the innovative technologies that have evolved (and continue to evolve) over the past decade, information professionals can be aware of their impact on the field of librarian and information science through collegiate collaboration.

In addition, the study did not focus on educators or individuals from other professional fields. A pilot study was conducted by the researcher in 2009, which surveyed both librarians and educators. The pilot study is described in chapter 3, along with data analysis and findings. After examining the results of the pilot study, the decision was made to limit the dissertation study to librarians and library volunteers because the role of librarians as deliverers of information differs from the role of educators. While both librarians and educators seek meaningful content for students (users or patrons), librarians are trained in information seeking behavior and evaluation of resources for acquisition and information delivery. The pilot study found limitations in interpretation of perceptions between educators and librarians because the survey

questions were not focused solely on information seeking behavior and library related activities.

Because virtual worlds have risen in popularity since 2005 (Kzero 2011), they may be considered a new platform. Understanding the potential role of virtual worlds by librarians and the potential for use in education required a theoretical framework with boundaries that included adoption. Besides Rogers' Diffusion Theory, hermeneutical phenomenology was considered as a theoretical framework for studying the adoption of virtual worlds by librarians. Through hermeneutical phenomenology, the stories of each librarian choosing to adopt a virtual world could be expressed and examined as unique experiences (Bradley 1992). The decision was made to base the study on the theoretical framework of Diffusion Theory as a starting point for research; however, the researcher believes future studies using hermeneutical phenomenology may provide further understanding of the adoption of virtual worlds by librarians through documentation of personal experiences.

Ottenbreit-Leftwich et al. used hermeneutical phenomenology in a study about teacher value beliefs associated with technology, collecting data from eight award-winning teachers through interviews, observation, and electronic portfolios. The use of technology integrated into professional development activities, classroom management, and student learning were addressed through coding of key words found in the participants' descriptions. The authors discuss the limitations of this small sample and suggested a future study to include longitudinal data over the course of a year or several years to better document the teachers value beliefs (Ottenbriet-Leftwich, 2010). This

exemplifies utilization of hermeneutical phenomenology as a method of researching human beliefs and perspectives associated with technology applications, which could be used in the study of virtual world adoption.

Although the fields of librarianship and education overlap, this study did not intend to address adoption of virtual worlds outside of librarianship. In addition to virtual world activity by librarians or within libraries, studies of virtual world activities within educational settings, in nursing, healthcare, science, art, and other areas were documented in the review of the literature (See Chapter 2). These interdisciplinary examples of virtual world content were applicable to the study because the professional role of the librarian often includes acquisition of content from a variety of subjects and disciplines.

Research Questions and Definitions

Two research questions are asked in this study:

1. What are the most influential of Rogers' five attributes of Diffusion Theory for librarians making the decision to adopt virtual worlds as a professional medium?
2. How are Rogers' five attributes of Diffusion Theory relevant to the adoption of virtual worlds when applied to the self-identified stage of adoption of librarians?

The findings in this study answer both research questions and also contribute documentation of the work of early adopting librarians during the years 2006 – 2011.

This documentation may help other librarians identify best practices and make decisions regarding the future role of virtual worlds in librarianship.

Definitions

Virtual World- a persistent online computer generated environment.

Avatar- a computer generated character representing oneself in a virtual world.

Sim- an island or land area in the virtual world of Second Life.

Teleport- to transport one's avatar from one sim or area to another instantly.

Lindens- currency used to buy and sell goods in Second Life.

Inworld- taking place within the virtual world of Second Life.

In summary, identification of factors contributing to the adoption of virtual worlds is an important stage in the examination of current technology trends as society rapidly adjusts to an increase in digital content, online communities, and changing information needs. While virtual worlds are not the only new media trend impacting these changing information needs of library users, research on this trend plays a role in understanding how librarians have adapted and continue to adapt to those needs. The focus of this research study has addressed the need to identify the attributes contributing to virtual world adoption by librarians using the framework of Everett Rogers' Diffusion Theory.

CHAPTER II

REVIEW OF THE LITERATURE

History of Virtual Worlds

This chapter reviews the literature on virtual worlds, including the history of virtual worlds evolving from video gaming and online communities. In addition to the use of virtual worlds by librarians and in libraries, the use of virtual worlds in education and across other disciplines is discussed. The benefits and advantages of virtual worlds are presented along with criticisms and disadvantages. The chapter closes with a summary and predictions for the future.

Knowledge and understanding of virtual world libraries and librarians begins with a study of emerging technology tools, particularly those that are used in gaming. Computer games, along with a host of other new technologies, have changed information literacy and a new generation of learners now enters schools and libraries with new needs, new ideas of interacting with media, and new information-seeking behaviors. Literacy today encompasses more than reading and writing. Students learn to decode images, symbols, graphs, diagrams, artifacts and multi-media including sound. Most students have spent a good deal of time learning visual literacy through playing video games, which could be called a *semiotic domain* (Gee 2003, 13). Gee uses the term semiotic (representation through signs or symbols) domain in the context of using

different modalities to communicate distinct types of meaning. While some people consider video games a waste of time, James Paul Gee argues that video games often present players with challenges that require critical thinking at high levels.

Over the past decade, video games have been designed with stories that evoke emotions similar to those readers encounter in literature. Students can identify with characters and events in video games in the same way that they can through reading literature or viewing films (Mastel & Huston 2009).

The Internet and media technologies now provide opportunities for individuals to create content and collaborate through online communities. People are less dependent on official channels for broadcast of information, as social networks allow users to share views and experiences. This change from physical communities to online communities will impact libraries and education in the future and research is needed to understand best practices for delivery of information in new modes (Stanziola 2008, 15). In a report entitled *The Future of Learning Institutions in the Digital Age*, the authors present the dilemma that educators face in a profession that requires high academic standards and best practices of pedagogy, yet is deeply rooted in an antiquated mode of learning (Davidson & Goldberg 2009, 14).

Because we process information in many different formats simultaneously, particularly online, the process of comprehending incoming information encompasses more than one “literacy.” The terms *media literacy* and *digital literacy* have been used to describe changing information processing skills of electronic formats.

Eric Meyers (2009) illustrates the blending of literacy skills by children within a shared virtual environment (SVE) by saying, "Logging in, creating an online identity, chatting, and sharing a profile with others are skills and "literacies" that transfer across several applications. Virtual worlds are one of the modes librarians and educators are investigating to determine how information will best be delivered in the future. Because virtual worlds allow users to collaborate synchronously, learners can blend physical reality and virtual reality into augmented reality (DeFreitas 2008). New technological platforms have swiftly approached a global, cultural, economic, and social convergence (Thomas et al 2007).

Whether learning about library and information studies, or continuing professional development, librarians can utilize this new mode for collaborative learning. An important point, made by Hinchcliffe from University of Illinois at Urbana-Champaign is "If virtual worlds are the next thing that our students use day-to-day, is not it better to have some experience using it yourself now, when there may be 2,000 students who use, rather than to start after 20,000 students use it?" (Peterman & Grieg 2007, 28).

Just as Web 2.0 impacted libraries by providing user-created content capabilities and social networking, virtual worlds may provide new methods of information delivery, immersive learning, and global collaboration. An immersive learning environment places the learner inside a simulation using a variety of media based on situations, cultures, practices or historical periods. The exponential growth of virtual worlds, particularly Second Life might cause some to consider it a fad. The Special Libraries Association

agrees with many library groups that it is not a fad but a trend that will continue to grow well into the future (Hulser 2008).

“Gaming” has become a popular buzzword in libraries, often touted as a way to lure patrons toward envisioning the library as a source for new media. Virtual worlds provide many of the advantages of video games and take them a step further by allowing users to create their own content both individually and through collaboration. The perception of the library as a center for new media may play a role in understanding the changing information needs of library patrons. Virtual worlds are just one of the many innovative tools that information professionals can champion as leaders in the Information Age (Reid et al. 2008).

A qualitative survey was used by Burgess et. al to examine three components that make up a community of inquiry, specifically (a) social presence; (b) cognitive presence; and (c) teaching presence (Burgess et al. 2010). The study took place during a summer semester with graduate students taking a course in Second life. Two outside coders (not affiliated with the research) analyzed data which identified a variety of factors relating to the three components and reported overall favorable responses for learning conditions in the virtual world setting. Results of the study showed that participants rated all three components of CoI (Community of Inquiry) favorable in Second Life. The majority of participants responded agreed or strongly agreed to questions for cognitive presence, social presence and teaching presence in a virtual world.

A two week project was designed as a learner-centered classroom experience for students in a graduate business class entitled Information Technology and Business

Transformation (Schiller 2009). The project developed a pedagogical design and assessment that can be shared with other educators interested in utilizing virtual worlds, such as Second Life successfully. This research paper compared traditional classroom models with a virtual world learner-centered model. Schiller found "With its capabilities of fostering innovation and interaction, Second Life offers a good medium for promoting learner-centered teaching in higher education" (Schiller 2009, 378).

Virtual Worlds in Libraries

The Alliance Library System of Illinois (ALS) began a Second Life (often referred to as SL) virtual world project in 2006, which grew in two years to encompass over 50 virtual "islands" and include over 800 participating librarians from around the world. Through creating a virtual, interactive simulation of people, objects, and events, users (called residents) interact in ways that are similar but not limited to interactions in the real world (Bell 2007). After a visit to the ALS, Julie Geradin said, "The Alliance Library on Info Island is set up like a real-life library. I was able to pick up notecards, free magazines, newspapers, and even a soda from the vending machine!" (Ford et al 2008, 324).

Between 2006 and 2009, Second Life became popular in the fields of education and libraries, such as a successful library project started by the ALS, and many universities started to build a virtual "presence" (Bell 2008). Tom Peters, one of the early leaders of this project wrote, "As an organization, the Alliance Library System in Illinois has provided a tremendous amount of organizational support for library initiatives in

Second Life and other virtual worlds, but the Alliance is almost the exception that proves the general rule that the future of VW [virtual world] librarianship may belong to inventive, creative, energetic freelance librarians acting alone or in loose collaborative groups, not via formal organizational structures and consortia agreements” (Peters 2008).

In a study on the librarians of Second Life, Kraemer and Greenwell (2008) reported, “While Second Life may not be the ultimate 3-D web platform that is embraced by all, it is essential for librarians to be familiar with virtual worlds like Second Life.” As more librarians and educators feel the need to understand virtual worlds, the advantages, disadvantages, attributes and characteristics of virtual worlds will need to be determined.

Librarians are working together to create immersive learning environments, teach classes, build virtual exhibits, and provide reference services (Floyd et al. 2007). While these pioneers explore potential for education, critics raise questions about sustainability, equal access, and validity. A study at the University of California’s Conference on Grey Literature addresses whether or not virtual worlds like Second Life are grey literature (not found through traditional methods) or ephemera (transitory printed material not intended for preservation) (Ferry et al. 2008). Whether or not Second Life can be considered grey literature was inconclusive due to the continued shift of documentation and bibliographic control. The authors concluded, “We remain uncertain of its validity as a form of literature and unclear that its documentation or preservation is the responsibility of any particular entities, however it will retain a sense of space” (Ferry et al. 2008, 17).

Global collaboration of librarians in the U.S., Europe, Australia and other parts of the world has shown evidence of new possibilities with the goal of incorporating them

into the library profession. The success of the Alliance Virtual Library Reference Desk was documented through observation in a research paper on the “new obstacles and advantages reference librarians encountered in the virtual world of SL (Second Life).” Erdman concludes that “there seems to be a place for reference librarians in the SL community and SL allows access to the library for residents who may not have access to a physical library” (Erdman 2007, 37).

Librarians like Bernadette Daly Swanson, known as HVX Silverstar in SL, are researching virtual worlds through observational methods. Upon opening an account in Second Life, new users (called *residents*) choose a name. Any first name can be chosen; however, last names must be picked from a provided list. Some individuals choose names similar to given names in the physical world (commonly referred to as RL for "real life") names but others choose names for a variety of reasons. Swanson (HVX) has produced numerous machinima (video taken in a virtual mode which combines the terms *machine* plus *cinema*) to document her exploration of virtual librarianship and immersive learning environments (Swanson 2008). Swanson believes machinima is an excellent method for archival purposes, preservation of immersive learning environments, and artistic expression as virtual world spaces constantly change and evolve.

Many of the librarians working in Second Life are volunteering hours in addition to full time careers in libraries. Taking on this “overtime” commitment is important to many librarians because the field has changed so drastically and rapidly. Canadian librarians, Krista Godfrey and Donna Dinberg, sum it up by stating, “Second Life does

not mean leaving behind traditional users but offers the potential to reach both new and underserved users who may not often use libraries” (Godfrey & Dinberg 2007).

Librarians are using virtual worlds to conduct training in reference work, interview skills, and development of new technology applications. Information literacy skills can be taught in Second Life in creative ways (Werts 2009). Reference tools created by virtual world librarians are illustrated by Florence Tang, a volunteer at the Alliance Virtual Library reference desk, which has changed the name to the Community Virtual Library Reference Desk (Tang 2009).

Through mentoring (many librarians create an avatar after being introduced to virtual worlds by a colleague) librarians can role-play scenarios and offer diversity training (Condic 2009). Role-play in libraries is a concept not limited to virtual worlds. In most aspects of life, individuals play a “role” through dress, gestures, and speech, depending upon the desired perception they wish to portray. Librarians seek to be seen as professional information providers, just as nurses wish to be viewed as healthcare specialists. Acting out a professional role can be classified as a dramaturgical perspective. Brian Quinn gives this example:

In turns of dramaturgy, library users must also deliver a performance, which must be realized dramatically. The student who sits at a study table surrounded by a pile of books, head in hand, assiduously taking notes, and furrowing his brow, occasionally looking up but with a far-away absorbed look in his eyes may be as fully realized a performer as the librarian involved with a patron. Other individuals in the same setting who keep looking up from their studies, glancing around distractedly, blowing bubbles with their gum, or checking messages on their cell phones may be having a more difficult time realizing the role of student (Quinn 2005, 334).

Lili Luo surveyed reference librarians volunteering in Second Life in order to systematically examine their activities. The virtual librarians reported similarities between physical libraries and virtual libraries, along with benefits of collaboration and collegiality, as well as the fulfillment of helping provide services while learning new technology. Patrons exhibited a curiosity about the virtual library, asking questions about the virtual environment. Luo points out, “In RL [real life], librarians would not encounter such questions, as users do not come to a library simply to see what it is like” (Luo 2008, 295).

Margaret Ostrander conducted an ethnographic study, which included interviews with avatars about information needs in Second Life. Ostrander excluded virtual spaces involving libraries and educational institutions and sought individuals from “popular social spaces such as dance clubs, music venues, or simulations of real world cities, to name a few.” In a Library Hi-Tech publication she stated, “Virtual communities are authentic, real sites, where real people seek real information, not a postmodern fantasy. At the same time, Second Life certainly has unique characteristics—some of which are fantastic—in comparison to the brick-and-mortar world” (Ostrander 2008, 515). The small number of participants in this study hinders generalizability. However, through lengthy interviews in the virtual world, Ostrander identified five themes of information-seeking behavior:

1. Social information seeking
2. Use of visual, experiential mechanisms

3. Serendipitous discovery
4. Use of the Second Life search utility
5. Play and humor

San Jose State University School of Library and Information Science has already developed a number of projects and courses in Second Life including a Learning Lab. The Learning Lab was designed with four objectives for experiential learning: a library-design toolkit, a student commons, a social skills venue, and a lecture hall. The virtual world projects were integrated into SJSU's core competencies of the MLIS program. A research study, designed by SJSU faculty using student surveys, found that 79% agreed or strongly agreed that they enjoyed using Second Life as a learning setting (Haycock & Kemp 2008). During the first semester of teaching in Second Life, summer 2007, a graduate course was taught completely asynchronously. In the fall 2007, the faculty decided to require synchronous meetings in the course culminating with a project similar to the school's e-portfolio requirement. Highly structured "lectures" and "guests" were added the following spring 2008. Faculty researcher, Jeremy Kemp, continues to share his experience in virtual world learning through an online wiki called SimTeach at <http://www.simteach.com/>. The SJSU study concluded with a thorough examination of advantages and disadvantages of learning in a virtual world which can help identify areas for future study and further research, such as privacy and safety, curriculum development, adoption and support.

In addition to providing helpful resources on SimTeach, Kemp promotes the open source content project for educators called "SLOODLE" which is built on the MOODLE

platform, widely used in schools and universities for online courses. SLOODLE helps manage avatar identity and resources in virtual learning environments (Kemp et al. 2009).

Two Library and Information Science professors, Sheila Webber from the University of Sheffield and Diane Nahl from the University of Hawaii, are teaching graduate library school students in the virtual world of Second Life. Webber and Nahl document numerous possibilities for sustainable learning, alongside benefits of low cost and global collaborations. In a journal article, Webber and Nahl write, "expanded connectivity facilitates greater interaction at all levels of the profession, enabling faculty, students and practitioners to collaborate virtually and learn from each other in unprecedented ways" (Webber & Nahl 2011, 9).

Virtual Worlds in Education

Research in virtual worlds is relatively new; however, exploration of this new frontier is illustrated in the book *Coming of Age in Second Life: an Anthropologist Explores the Virtually Human* (Boellstorff 2008). Since virtual worlds have evolved out of MMORPG's (massively multiple online role-playing games), they are often viewed as games. Video games may be played within Second Life, but the environment itself is not a game. Second Life has been commonly called a *communication platform* or *virtual environment* because no set rules or goals are presented to individuals involved. In describing the creativity of this new *techne* (a craft-like knowledge), Boellstorff writes, "I hope to have left the reader with a sense of wonder at the emergence of our New Worlds,

a sense of wonder at how they draw upon our oldest traditions while presenting new possibilities” (Boellstorff 2008, 248).

Steve Prentice, Vice President of Gartner Research, spoke at the Gartner Symposium IT Expo 2007 and predicted that 80 % of Internet users would be active in virtual worlds by 2011 (Prentice 2007). While that prediction may have been an overestimate, the growth in virtual world user accounts continues to increase (see fig. 2.1.). In 2009, Linden Labs, creators of Second Life, reported an average 70,000 users logged in at any one time. The number of registered users exceeded 27 million in 2011, but that number is widely viewed as unreliable because a large number of users have more than one account. Linden Labs allows users to create an alternate account, known as an *alt* avatar. Some individuals try Second Life and become inactive which also makes statistics difficult to calculate.

Kzero Worldwide, a global market analysis company reports that the largest user group in virtual worlds is children and teenagers. The trend is increasing, with over 900 virtual worlds predicted for virtual residents by 2012 (Kzero Worldwide 2011).

Age Range	2009				2010				2011	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
5 to 10	77m	114m	152m	179m	190m	211m	219m	235m	272m	320m
10 to 15	246m	334m	367m	392m	413m	444m	468m	511m	561m	652m
15 to 25	73m	99m	117m	193m	237m	273m	288m	299m	313m	385m
25+	18m	21m	23m	25m	27m	30m	34m	36m	39m	42m
Total	414m	568m	659m	789m	867m	958m	1,009m	1,081m	1,185m	1,399m

Figure 2.1. Kzero virtual worlds registered accounts by millions. (Kzero 2011)

For educational use, Kzero reports Second Life to be the most widely used for higher education and Whyville to be best for K-12 schools. Growth in use for assistance in student learning is predicted in areas of remote learning (regardless of geographic location, collaborative learning, individual learning, and recruitment of new students (Kzero 2011).

Although commercial companies were first to create virtual worlds for young people, educational content for K-12 is on the increase. Students can form real-world global communities that are based on best practices and pedagogical strategies in online communities, such as Quest Atlantis (Czarnecki 2008).

Some parents and educators are concerned with the rapid increase in use among preteens and children because they are impressionable and still forming identities. A study on preteen use of virtual worlds identified four inter-connected parts that illustrate the complexity of the phenomenon. The author proposes that preteen virtual world environments exist as: (1) an identity space; (2) a new literacy; (3) a problem-solving context; and (4) a community (Meyers 2009).

Although not the only virtual world available for educational instruction, as documented in the Kzero report, Second Life is the most widely used by academia. Educators and librarians are exploring other virtual worlds as open source content spreads across platforms such as Open Sim, Reaction Grid, Joykadia and Inworldz. Reaction Grid and Jokaydia Grid are examples of virtual world spaces created specifically for K-12 education. "JokaydiaGrid is a PG environment designed for engaging kids in virtual

worlds adventures, and is a much more viable alternative for K–12 educational use” (O’Connell 2010, 2).

Questions about how virtual worlds will affect not only education, but other areas of society, such as the law are on the rise. In a book entitled, "The State of Play: Law, Games, and Virtual Worlds," the authors state, "Some of the new organizations we form online will be more visible than any we have created, offline, in the past. We will begin to see the social fabric and our own place in it” (Balkin & Noveck 2006, 255).

A research study based on the Technology Acceptance Model (TAM), a conceptual framework based on the theory of F. D. Davis (1989), developed a survey designed to measure *perceived usefulness* and *perceived ease of use*. Other factors measured in the survey included *computer playfulness*, *computer self-efficacy*, *computer anxiety*, and *behavioral intention to use Second Life*. Surprisingly, the perceived ease of use had no direct affect on the behavioral intention to use Second Life among undergraduate and continuing studies students in a university in Northeastern United States where this study took place in the fall of 2007. Results of this study suggest, “Students perceive the achievement of learning tasks as extrinsic to the use of the virtual world. In other words, the use of SL is perceived as only the means, or interface to achieving learning, as opposed to the central component of the process” (Shen & Eder 2007). The creativity, playfulness, and social interaction far outweighed feelings of computer anxiety.

A research study called “Second Life—New Opportunity for Higher Education” was conducted at Jonkoping University in Sweden through data collected from four

universities using SL to teach courses: University of Central Missouri (U.S.A.), Kalmar University (Sweden), Molde University (Norway), and Oakland University (U.S.A.). The study used a combination of quantitative and qualitative research methods including faculty member interviews in Second Life and (for the quantitative side) a standardized questionnaire was sent out to the students at different universities within Second Life. In addition to the depth interviews, qualitative participant observation studies were carried out at various spots in SL (Andersen et al 2008). One of the findings of the study centered on the difficulty students had in becoming familiar with the environment initially. Andersen reminds us “it is important to note that with all new mediums and educational tools, an acclimatisation-period will always exist. The effect of the learning curve, or steepness if one will, can however be cushioned through preparatory means” (Andersen et al. 2008, 41).

Diane Murley talks about her own learning experience after several attempts in Second Life. Frustrated by two failed attempts, Murley struggled to understand what was causing her problem in grasping this mode. Through personal experience, Murley examined the variety of learning styles used within a virtual world mode. Much literature has been written on the way individual learning styles contribute to comprehending difficult concepts. She concluded that a variety of learning styles are presented in Second Life by stating, “The weekly sessions held in Second Life are also good for read/write learners, because the presentations are done via text chat, and transcripts are available after the class. The in-world sessions include demonstrations and practice activities, which are good for the visual, kinesthetic, and multimodal learners” (Murley 2008, 792).

Murley concluded that the time spent conquering the “difficult learning curve” was worthwhile.

Sun Microsystems launched a virtual world platform called Project Wonderland in November 2007. This open source 3D environment is an example of using this new technology as a workplace for any field of study through synchronous communication. An advantage that Second Life, which is operated by Linden Labs, has over open source environments is the numerous building tools already in place. Second Life has been criticized for having a “high learning curve” but to date no other virtual world offers users or *residents* immediate access to as many 3D tools. Tom Werner of Brandon Hall Research says, “open-source virtual-worlds platforms are bursting with possibilities” (Werner 2008).

The University of Washington offers a course called *Certificate in Virtual Worlds* which is taught entirely in Second Life. During the first trimester, students visit several other virtual worlds to understand similarities and differences. A machinima (showing three other virtual worlds visited) which was taken during the course showing various virtual worlds used for business, education, and a variety of professions (Hill 2009). Virtual worlds such as PowerU, 3Dexplorer, and Teleplace provide services for business enterprises; however, Second Life continues to be recognized as the leader for higher education and academia (Kzero 2010). Graduates for the University of Washington's Certificate in Virtual Worlds received diplomas as their avatars walked across the virtual stage which was documented in a machinima mixed reality video (Hill 2010) and (Hill 2011).



Figure 2.2 Graduation University of Washington in virtual worlds

Virtual Worlds in Other Fields

Potential for research in virtual worlds, such as Quest Atlantis, Second Life, or even World of Warcraft, has become evident, not only in education, but in economics, science and other disciplines. William S. Bainbridge, in Science Magazine, writes, “Many virtual worlds may foster scientific habits of mind better than traditional schools can, because they constantly require inhabitants to experiment with unfamiliar alternatives, rationally calculate probable outcomes, and develop complex theoretical structures to understand their environment” (Bainbridge 2007, 475).

Nearly every type of human experience and behavior is currently being simulated in the virtual world of Second Life, including interdisciplinary learning, research, creative expression, business ventures, government work, entertainment and social interaction. Librarians interested in providing virtual resources, such as landmarks to educational

islands, need to become aware of the content available in Second Life and the disciplines providing that content. Numerous companies in Second Life have documented training sessions, conventions, and advertising; however, the focus of this research article remains within education and libraries, deliberately excluding business and commerce. Second Life hosts many educational events and conferences, including sessions for the International Society for Technology in Education and the American Library Association. A search for interdisciplinary literature was conducted and the disciplines to be examined for this research include nursing, health, science, literature, art, and military training.

Nursing and Health

Some islands in Second Life are devoted to health and medicine, such as Virtual Ability, an island devoted to helping individuals with physical disabilities, and their caregivers. Nursing programs at three colleges utilizing Second Life were examined in Washington, Kansas, and Wisconsin to assess the students' experiences and compare them with traditional learning approaches. At first, some students complained about the difficulty of learning to maneuver avatars and learn computer skills, particularly those with little experience with technology tools. Over time, all of the students overcame obstacles and chose working in Second Life over a traditional written assignment when given the same amount of time for completion (Skiba 2009).



Figure 2.3. Virtual Ability Island

The use of enactive role-play, on the topic of euthanasia, found the platform of Second Life to be an excellent way to use a constructivist approach. A group of 18 year olds of mixed gender were allowed open-ended responses and were interviewed after five sessions of role-play. Many of the students reported the experience to be as “real as face-to-face” (Jamaludin 2009).

A paper introducing the concept of enabling gaze-based interaction for users with motor-control disabilities by controlling an avatar in Second Life resulted in inherent problems (Bates et al 2010). Both camera movement and locomotion were difficult and it is evident that game developers will need to design better on-screen assistive tools to help disabled users control avatars effectively.

In September 2010, the virtual Mayo Clinic Conference Center in Second Life held a virtual conference with Julie Tilley, which provided an overview of wound management, the functions of the skin, the phases of wound healing, and optimization of wound healing. Tilley shared examples of the many benefits of using virtual worlds for simulation and training in the medical profession along with over 40 conferences held at the virtual Mayo Conference Center. Patients, medical workers, caregivers, and students can learn and simulate both mental and physical challenges and situations (Tilley et al, 2011).

Science

An interesting study with university students in Second Life using role-play on the topic of euthanasia was conducted over an eight week period. Class text logs were archived and content analysis was used as a method for determining results. Conclusions stated, “There was consensus among the students that the role-playing activities within Second Life played a major role in the changes they experienced when discussing a contentious topic. Students were able to express their views more effectively” (Jamaludin et al 2009, 327).

Literature

Virtual worlds provide publishing opportunities for writers and a variety of encounters with literature. Second Life hosts many magazines where residents write, share machinima, publish photos, and advertise products created inworld. Book

discussions are particularly successful virtually, because audiences are not limited by distance. A 3D simulation of Frances Hodgson Burnett's *Secret Garden* allows the individual to enter the story. Shakespeare's plays can be attended at the Globe Theatre in Second Life, where actors from around the globe use avatars in a live production. Poetry slams and contests are popular literary events. Many authors have held discussions about their books in Second Life (Lamb & Johnson 2009, 69). Children have the opportunity to publish their own newspaper in the educational virtual world of Whyville.

The use of metaphor is prevalent in virtual worlds and immersive learning. Virtual 3D objects can simulate real objects or can represent metaphorical concepts. The University of Leicester built a virtual island called Media Zoo using the metaphor of a zoo as a learning laboratory. Visitors wander the zoo learning about emerging digital technologies (Wheeler 2009).

Art

Augmented reality (AR) gives a new dimension to performance art at Georgia Institute of Technology. Using a combination of virtual reality in Second Life and physical reality by providing users with Head-Mounted Displays (HMDs) using large LCD screen mirrors, players can interact on both the virtual stage and the physical stage. Performances are video-recorded in both worlds, too. AR is a newly evolving form of mixed media and mixed reality that is promising for performance art and other fields. (Farley et al. 2009).

An example of virtual world opportunities for art enthusiasts are the many beautiful art exhibits and museums, such as the Dresden Museum and the "Starry Night"

project. A replica of the painting by Van Gogh was created as a building project in Second Life. The virtual island is no longer available; however, a machinima archived the art project (Dingo 2008).



Figure 2.4. Starry Night exhibit

Other Uses: Military Training

Librarians provide resources to patron communities in a variety of formats on all areas of life, beyond educational curriculum, research needs, and personal quests for information. Access to information now includes understanding of best practices of social media which impact all areas of society: the home, the school, the community, local government, and global society. The United States Army has increased use of Web 2.0

technologies significantly, especially after President Obama began using Twitter as a communication mode. Blogging and Facebook are both popular tools with soldiers. The Army opened a recruiting station in Second Life, complete with a training area and Apache helicopter rides (Anderson 2009). ISTE (International Society for Technology in Education) Island in Second Life holds educational workshops and training sessions weekly. An example of military training using virtual reality was shared with educators on ISTE Island, which was posted on the PBS Digital Nation website (Hill 2009). This is just one example of information access shared in a virtual world embedding a variety of literacies and technology tools. Understanding the use of virtual worlds in various aspects of global activity is helpful to librarians as media formats and communications platforms evolve.

Benefits and Advantages of Virtual Worlds

A study by Reid shows that virtual worlds are just one of the many innovative tools that information professionals can champion as leaders in the Information Age (Reid et al. 2008). The study concluded that wikis, blogs, and RSS were the most widely used social networking tools in 2007 among 606 information professionals surveyed. The authors mentioned that the topic changed over several months as technology tools rapidly evolve, but the focus on online virtual communities remained the same.

Much of the current literature extols the benefits afforded by virtual worlds, including cost effectiveness, global collaboration, creativity, individuality, and synchronous learning. Initially, universities often replicate campuses to appear similar to

physical campuses. A major benefit of Second Life, however, is the ability to learn about cultures and locations that are no longer in existence or are no longer accessible in the physical world, such as the ancient Saami people in Northern Europe or Kalasha people in North Western Pakistan by visiting simulated learning environments (Salmon 2009, 530). Learning in an immersive mode allows the student to feel “present” in the place. Simulation of situations that could be dangerous in the real world (such as battles of war or medical procedures) offers learning experiences, too.

A position paper discussing studies on communication and collaboration in Second Life in 2007 looked at the impact of VoIP (Voice over Internet Protocol) which allowed users to speak through voice, rather than text only. The paper categorized users as two preferential types: immersionists (individuals who prefer to remain anonymous) and augmentationists (those who view virtual worlds as an extension of real life identities or as a communication tool). Augmentationists were much more likely to use the new voice capability. Second Life building tools were used to understand collaboration through the built in camera mode, which (unlike most video games) is moveable. Users can choose to view the virtual world from the avatar’s perspective or from an angle outside the avatar. Most individuals use the avatar perspective when talking with another person, but use the outside angle perspective while building objects (Wadley 2007). The myriad of tools available in Second Life, including VoIP and programming tools, are considered advantageous over many other virtual worlds.

Ralph and Stahr (2010) discuss three main advantages for librarians in SL: networking, best practices, and collaboration. Through development of professional relationships, librarians can form a global network. Libraries are no longer separated by distance, but can share electronic resources and communicate synchronously across the globe. Through collaboration, best practices for utilizing innovation for librarianship can be identified.

As enterprises expand and academic institutions adopt virtual world environments, benefits and advantages have been documented. A “roadmap” for further research was designed in a study, after listing virtual world affordances as: “the facilitation of tasks that lead to enhanced spatial knowledge representation, greater opportunities for experiential learning, increased motivation/engagement, improved contextualisation of learning and richer/more effective collaborative learning as compared to tasks made possible by 2-D alternatives” (Dalgarno & Lee 2010). These researchers believe that more studies are needed to test the basic assumptions and link the characteristics to these affordances. After validating those affordances, guidelines for best practices will be established for the development of optimal virtual worlds in the future.

Criticisms and Disadvantages of Virtual Worlds

Critics of virtual worlds raise questions about accessibility for those without the latest computer systems with compatible graphics cards and also about sustainability as new tools come on the market. As new open-source platforms become common, libraries and academic institutions may build virtual spaces that are private and secure. Mary

Mallory cautions against jumping into the latest trend with her “tales of technology gone wrong” (Mallory 2008). Most schools and librarians have experienced mistakes in purchasing a technology gadget only to find it outdated quickly or replaced by a different format.

Some librarians believe the library as a physical space is far more important than a virtual space ever will be (Forrest 2008). Raising questions about the motives for building 3D spaces, these librarians feel the younger generation, raised on Playstation and Xbox games, need to be taught traditional information skills through books (Collins 2008). The conflict over physical books and digital resources is not new to the profession. In the movie *Desk Set* (Twentieth Century Fox: 1957), starring Katherine Hepburn, an intelligent reference librarian in a research department is worried about being replaced by an electronic brain (Poe 2008).

Joe Sanchez illustrated many of the benefits of Second Life along with six key criticisms (Sanchez 2008). Criticisms included loss of new users (dropout rate), a propriety software (as opposed to open source), intellectual property rights retained by Linden Labs (creator of Second Life), management and cultivation of presence (sustainability), and “over-hype” of the technology. Critic Steve Smith believes Second Life did not fulfill the promise of online immersion but led to the real hit- “social networks - 2D, low-tech profile pages that fueled phenomenal growth at MySpace and Facebook (Smith 2008).” Some critics go so far as to call Second Life “frightening” and give warnings such as, “the result is a frightening catalogue of neglect and self-neglect, of

disintegrating families, foreclosures, relationships ruined, and businesses going belly up as a result of individuals diving too deeply into this online realm” (McKee 2009).

The concepts of virtual identity and role-play raise both psychological and philosophical questions. Discussions about whether or not an avatar can be intimidated, bullied, or even raped, have been argued as far back as 1999, when Julian Dibble wrote *My Tiny Life: Crime and Passion in a Virtual World*. The novel depicts a cyber-rape in the text-based MUD called Lambda-MOO. Laws are not yet clear; however repercussions for deception and personal responsibility for actions are being investigated. Even earlier, in 1995, Sherry Turkle proposed “We don’t have to reject life on the screen, but we don’t have to treat it as an alternate life either. We can use it as a space for growth” (Turkle 1995, 263). Over a decade later, after years of research in the area of human computer interaction and social robotics, Turkle has become more critical of virtual worlds and cautions users to beware of valuing the virtual as much, or more, than the physical. She writes, “Technology ties us up as it promises to free us up” (Turkle 2011, 32).

Without considerations for educational content and information services, virtual worlds may be considered by some as less valuable than most video games, which have clearly identified goals. Adam McKenna cautions users by stating, “The lack of standard game elements such as level progression or any guiding principle becomes a void in which endless consumption becomes the goal — virtual items paid for with real money — mirroring the endless dissatisfaction coded into us by a culture predicated on instant gratification” (McKenna 2009, 19).

School districts, concerned about Internet safety for students under the age of 18, are often hesitant to provide access to virtual worlds, despite the findings showing educational benefits. Understandably, safety and security for students is a top priority, along with protection of students' privacy (SLJ 2008). In addition to concerns about student safety, the importance of sustained reading of high quality literature is stressed and some critics worry that student involvement in virtual worlds will make them less likely to read. Longtime school librarian, Janice Douglas writes, "Left to their own devices, they spend hours using the Internet, iPods, Gameboys and cell phones – totally vacuous pastimes that numb instead of stimulate the mind" (Douglas 2008, 271). Privacy issues have always been a concern for librarians and today that concern involves both the physical and virtual security of data and users (Moore 2009).

Summary and Predictions for the Future

New Media Consortium predicts (Horizon Report 2011) augmented reality to increase in relevance over the next two to three years for teaching, learning, and creative inquiry, alongside game-based education (NMC, 2011). NMC, with approximately 300 members and educational organizations, is a non-profit organization dedicated to learning and creativity through new technologies (Kattelman 2008). NMC provides over 100 sims (Second Life islands) to universities and holds events, conferences, symposiums and programs in the virtual world.

Professors at the University of Genoa, Italy, have researched serious virtual worlds and human-computer interaction through task-based learning. Access to virtual

worlds through smart phones is now possible and researchers believe interoperability and standardization of interfaces are a necessary evolution (Bellotti et al. 2010). In a report on serious virtual worlds, Sara DeFreitas writes, “Together these and other ‘convergent technologies’ and mash-up applications are having a radical impact upon the way that learning, teaching and research are being undertaken and have the potential to transform education” (DeFreitas 2010, 47).

While research documents the advantages and benefits of virtual worlds for education and other fields, some critics believe Second Life will no longer be in the forefront due to costs. In October 2010, the Chronicle of Higher Education discussed a potential "mass exodus of educators" from Second Life due to Linden Labs, the company that created Second Life, announcing a price increase that would affect nonprofits and universities. Geoffrey Little wrote about the impact of this increase on academic librarians stating, "Despite all of this, both Godfrey and her co-author, McGill librarian Amy Buckland, believe that there is still an interest in and future for immersive online 3D environments"(Little 2011, 173).. Whether or not Second Life remains the leader for educational use in virtual worlds, there is evidence of continued growth in the medium for libraries as other virtual worlds are launched for all age groups (Kzero 2011).

In summary, the review of literature on virtual worlds encompasses a variety of disciplines, subjects and professions which may be of interest and use to librarians and library users. As advantages and disadvantages emerge and the hardware needed for virtual world applications advances, online communities will continue to grow and change. This literature review provided examples of the variety of purposes as well as

both benefits and problems encountered in using virtual worlds and serves as a foundation for implementing Rogers' Diffusion Theory as a framework for examining virtual world adoption by librarians. The next chapter will disclose the survey methodology used and a pilot study conducted prior to this research.

CHAPTER III

METHODOLOGY

Theoretical Framework

A survey methodology was chosen for this research study which is based on Everett Rogers' Diffusion of Innovation. Because the use of avatars as a representation of individuals in virtual worlds is considered a new and emerging trend, the simple methodology of a survey was chosen intentionally to provide a balance between the complexity of the terms, understanding of the attributes of diffusion theory, and the correlation of attributes to responses by participants. This chapter includes an explanation of the Diffusion of Innovation which is the theoretical framework, the methodology, the design of the research study and the method of data collection and analysis. In addition, a pilot study conducted prior to this research is disclosed.

Numerous information theories have been developed to address innovation within the information science field, such as the Technology Acceptance Model (TAM) (Shen & Eder, 2009). Everett Rogers' Diffusion of Innovations Model was chosen for this study because it seeks to avoid *pro-innovation bias*. "If diffusion scholars could more adequately see an innovation through the eyes of their respondents, including why the innovation was adopted or rejected, diffusion research would be in a better position to shed the pro-innovation bias of the past" (Rogers 2003, 116). While TAM addresses

perceived usefulness of a new technology, Rogers' theory contains different terminology. "The former belief, perceived usefulness, in TAM is similar in spirit to Rogers' conceptualization of the relative advantage of an innovation" (Agurawal et al. 1998, 6).

Diffusion of Innovations

Everett Rogers published a dissertation in 1957 which analyzed the diffusion of several agricultural innovations in the rural community of Collins, Iowa. He encountered other studies of diffusion on such widely diverse subjects as kindergarten, driver training schools, and spread of antibiotic drugs among medical doctors. The similarities in diffusion of new ideas convinced Rogers that the diffusion of innovations was a kind of universal process of social change (Rogers 2003).

Thus, Diffusion Theory deals with the process of adoption of a new innovation. Rogers believed that members of a given social system make decisions over time through a communication process involving five stages: knowledge, persuasion, decision, implementation, and confirmation. Adopters may embrace the new innovation at various intervals from early (Innovators) to late (Laggards) (see fig. 3.1.). Surry (1997) built upon Rogers' diffusion theory which explains that some people are predisposed to being innovative and tend to adopt an innovation earlier than others.

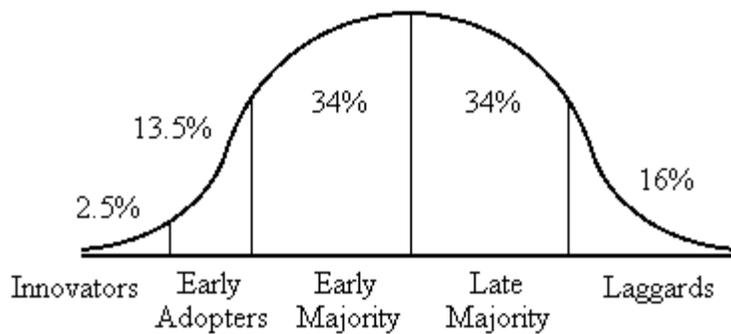


Figure 3.1 Bell curve based on Rogers' diffusion theory. (Surry, 1997).

Attributes of Diffusion Theory

When a new innovation is introduced, rates of adoption by a community may be explained through five characteristics or perceived attributes, also identified by Rogers. According to Rogers (2003), the following perceived characteristics (5 Perceived Attributes) of innovations help to explain their different rates of adoption:

1. Trialability (the degree to which an innovation may be experimented with before adoption),
2. Relative advantage (the benefits and advantages understood by adopters),
3. Compatibility (the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters),
4. Complexity (difficulty to understand or use),
5. Observability (the degree to which the results of an innovation are visible to others).

Gerpott used these same characteristics (or attributes) in a study on the use of mobile handheld devices and compared Diffusion of Innovation (DOI) with the Technology Acceptance Model (TAM) developed by Davis (1989). After examining differences in the two models, Gerpott described DOI as more comprehensive (Gerpott 2011).

Diffusion Theory is the process by which an innovation is communicated through channels over time among members of a social system. An innovation is an idea, practice, or object that is perceived as a new by individual or other unit of adoption. Knowing of an innovation creates uncertainty in the mind and the potential of a new idea impels an individual to learn more about the innovation. Once information-seeking activities reduce uncertainty about expectations to a comfortable level, a decision concerning adoption is made. If adopted, further evaluation about the effects of the innovation is carried out (Orr, 2003).

According to Orr, Diffusion Theory is the process by which an innovation is communicated through channels over time among members of a social system. An innovation is an idea, practice, or object that is perceived as a new by individual or other unit of adoption. Knowing of an innovation creates uncertainty in the mind and the potential of a new idea impels an individual to learn more about the innovation. Once information-seeking activities reduce uncertainty about expectations to a comfortable level, a decision concerning adoption is made. If adopted, further evaluation about the effects of the innovation is carried out (Orr, 2003).

The essence of Rogers' Diffusion Theory is the information exchange through which one individual experiences and communicates a new idea to others. Through the innovation-decision process, an individual passes from knowledge (first knowledge of an innovation) to persuasion (formation of an attitude toward the innovation) to decision (the decision to adopt or reject) to implementation (actual use of the innovation) and finally to confirmation (commitment to adopt). Steed (2009) referred to virtual worlds as being in their “infancy”; therefore, most academic institutions and libraries would be classified as currently in the knowledge or the persuasion stage.

As innovations tend to be related to technologies, it is not surprising that library and information science research on diffusion theory has focused on technology, particularly the Internet and various digital tools that have emerged in the past decade. For example, Hung conducted research on users to target and why and how to inspire their participation in a social networking site using Rogers' Diffusion Theory (Hung et al. 2011). The study merged Diffusion Theory with Von Hippel's work on web toolkits blended into a questionnaire (Von Hippel. 2002). Results concluded that Web 2.0 users creating and sharing innovations are strongly interested in using add-on web toolkits for both personal and marketing campaigns.

Pilot Study

Prior to design of the research study for this dissertation, research on the adoption of virtual worlds began with an exploration of the medium with the goal of familiarizing and understanding the skills necessary to communicate, deliver information, and discover

best practices for libraries and education. Upon mastery of basic skills, a pilot study survey was used to determine current perceptions on the adoption of the innovation among librarians and educators (see Appendix A: Pilot Study Survey). This pilot study, also based on Diffusion Theory, was conducted by the researcher in 2010. Both librarians and educators were surveyed through questions which matched Rogers' five attributes, as well as the most useful tools for libraries and education in virtual worlds using fourteen tools identified through exploratory research (Hill & Lee 2009).

Pilot Study Summary and Conclusions

The pilot study was designed with Rogers' five attributes in mind *prior* to writing the questions. Each attribute was addressed three times and each was clearly identified in each survey section. The fact that participants may be more apt to agree to responses when given limited choices on a Likert Scale using clearly defined terms (stated characteristics or attributes) was found to be a limitation.

The two virtual world tools perceived by librarians and educators as most useful for information delivery were avatars (creating a sense of synchronous presence) and virtual field trips (for shared experience in simulation) upon conclusion of the survey. The attributes that were found to be the strongest predictors of adoptions were observability and compatibility; however, the lack of knowledge from the majority of participants was found to be a limitation which led to the decision to limit both the target group and the requirement of personal experience.



Figure 3.2. Avatars of librarians meeting in SL through shared "sense of presence."



Figure 3.3. Virtual field trip to the Land of Lincoln in SL.

Recognition of avatars as an important virtual tool may be a strong predictor in the pilot study because that is the most widely known tool for those with little knowledge or experience in virtual worlds. This led to the decision to require a minimum of two years experience for participants. Compatibility scored high as an attribute for diffusion of this innovation, perhaps, because librarians and educators have been inundated with changing technology for the past decade and many realize that not every new technological device is compatible with education or librarianship. Identification of best practices and purposes of technology tools has become imperative before embracing trends.

An interesting factor found in the pilot study was the importance of observability as a predictor because most of the individuals surveyed had read very little literature on the subject. Participants with no experience in virtual worlds, such as Second Life may have no real understanding of benefits. These individuals may conjecture potential advantages or have preconceptions about limitations. While a body of literature is rapidly expanding, this study shows that many individuals are unaware of the literature, have limited time or little interest in reading the literature, even though a large majority believe this innovation will be important in the near future. The pilot study led to the conclusion that limiting the survey to one profession (librarianship) and requiring at least two years experience in a virtual world would provide a better scope of understanding in data analysis of the attributes as applied to Diffusion Theory.

Research Study Design

Design of the dissertation research study on the adoption of virtual worlds by librarians was narrowed in focus and scope after completion of the pilot study on adoption of virtual worlds by both librarians *and* educators. As explained, the decision to narrow the participants to only librarians with at least two years experience was made with the goal of better identification and understanding of the factors leading to adoption. The combination of two groups (librarians and educators) in the pilot study led to difficulty in interpretation of the meaning and connotation of attributes. For example, the relative advantages perceived by an educator may be different than those perceived by a librarian even though both professions seek to help students gain knowledge. The requirement of at least two years experience was added to the survey to provide a foundation of mastery of basic skills for participants. Respondents who were completely unfamiliar with virtual worlds added no significant data to the pilot study in relation to the stages of adoption according to Diffusion Theory.

The five attributes (categories) of Diffusion Theory used in the pilot study were also used in the dissertation study, along with keywords, phrases, topics, and themes that emerged, to identify particular attributes demonstrated by librarians choosing to adopt virtual worlds. Because many librarians from all types of libraries are volunteering to explore virtual worlds, the stages of adoption of libraries are difficult to determine. Some libraries designate one librarian to utilize a virtual world, such as Second Life, for an experimental project. A public library, for instance, might build a virtual space for an

exhibit and an academic library might share resources or present research at a virtual symposium. Therefore, instead of striving to identify the stages of adoption for *libraries*, this study will examine the attributes among *librarians* and the relationship between those attributes and self-identified stages of adoption. Each participant was asked to choose the stage the level of adoption, according to Diffusion Theory, that best matched their self perception.

Community of Inquiry Based Survey Design

For over a decade a theoretical framework called Community of Inquiry (CoI) developed by Garrison, Anderson, and Archer has been used to study online learning platforms through three elements: cognitive presence, social presence, and teaching presence (Garrison et al. 2010). The authors developed a survey using these three crucial types of presence necessary for distance education and online learning. Using the CoI survey as a basis, this research study on the adoption of virtual worlds by librarians designed a similar questionnaire aligned specifically with the five attributes of Diffusion Theory. Questions were formulated through a modification of the Community of Inquiry Survey (Garrison et al. 2010) (see Appendix B: COI Survey Instrument). For example, one of the questions regarding affective expression in an online learning community, "Getting to know other course participants gave me a sense of belonging in the course." was edited to "14. Getting to know other librarians gave me a sense of belonging inworld."

After aligning the Diffusion Theory attributes with the CoI Survey, the questionnaire was implemented using the online resource PsychData (see Appendix C: Dissertation Study Survey). A Likert Scale provided quantitative data and the participants were given the opportunity to elaborate and explain answers through additional text boxes, if desired. The additional information from text boxes was used for clarification and a better understanding of the connotation and perception of the various attributes. Rogers' five attributes were not stated in the questions by exact terms, but were inferred through seven different questions for each. Examples of participants' explanations and comments are discussed in the data analysis and findings.

The dissertation study questionnaire was designed through modification of a the Community of Inquiry Model, not only because the model has been successful in understanding online behavior for over a decade, but also because the model provides a good match with Diffusion Theory and addresses the limitations found in the pilot study. "In particular, the CoI instrument provides a means to study the dynamics of online communities of inquiry, both among and within the presences" (Garrison et al 2010). Using the three elements of presence (cognitive, social, and teaching) as an organizational structure, the dissertation survey made two major changes: (1) limiting the audience to librarians *only* with at least two years experience in a virtual world and (2) creating questions aligned to the attributes of Diffusion Theory that were *unlabeled*.

Recruitment of Participants

Participants for the proposed study were recruited through the Google Group of Second Life (SL) Librarians and inworld (with the virtual world of Second Life) through

library groups, such as the American Library Association in June 2011. Only librarians and library volunteers who have been involved in SL for over two years qualified to participate. By clicking on an avatar's profile, the date of creation (also known as a *rez* date) is shown. This method was used to identify qualifying participants.

Participants were advised of the time commitment and the incentive included a chance to win lindens (the Second Life economy) in the amount of L\$10,000 (approximately \$40.00 in US currency). Participants were assured that confidentiality would be maintained, including the option to participate with a unique alternate avatar, since the librarians have worked in SL for a period of two years and could be identified through avatar names or characteristics. Out of 66 participants, 48 chose to give the name of his or her avatar. From those 48 names, one random avatar was chosen to receive \$10,000 lindens in the virtual world of Second Life. The survey was open from June 11 through July 18, 2011.

Data Collection and Analysis

Data from the dissertation survey was collected from the online survey site, Psychdata, and extracted into SPSS, a statistical analysis program. The five attributes of Diffusion Theory (trialability, relative advantage, compatibility, complexity, and observability) were cross tabulated and compared to the participants' self-identified stages of adoption. Each question, designed to address an attribute, included textual space for the participant to elaborate, explain, or give an example. During data analysis,

each statement was examined to match the attribute for a better understanding of the connotation, the clarification, and the intention of the respondent's answer.

The five attributes were each addressed seven times through a total of 35 questions in a random order, so as not to alert participants to any particular concept. The participants were given text box space to explain personal perceptions and experiences, but were not made aware of the attributes or the importance of the self-identified stage of adoption. (see Appendix D: Dissertation Study Survey with Labeled Attributes). Any irregularities or misunderstandings of particular questions are addressed in the discussion and summary of the findings.

Understanding, analyzing and interpreting the data for this study would be nearly impossible without personal involvement and skill level with the virtual world of Second Life; however, the assumption of the researcher's ability to remain neutral and subjective could be questioned or viewed as a weakness. Empirical support for the data is given with participants' responses and explanations, including any misinterpretation of a survey question.

In summary, this chapter has addressed the theoretical framework of Rogers' Diffusion Theory and the methodology of a survey based on the successful Community of Inquiry Model (Garrison et al. 2010). Findings from an initial pilot study were explained and related to the design of the research survey and the choice of a target audience of participants. Methods of data collection and analysis were explained with the

findings of the cross tabulation for attributes with the self-identified stages of adoption to be concluded in the following chapter.

CHAPTER IV

FINDINGS

This chapter presents the findings of the data collected in the research study survey on the factors leading to the adoption of virtual worlds by librarians based on the five attributes of Diffusion Theory. Discussion of the findings will address the following research questions:

1. What are the most influential of Rogers' five attributes of Diffusion Theory for librarians making the decision to adopt virtual worlds as a professional medium?
2. How are Rogers' five attributes of Diffusion Theory relevant to the adoption of virtual worlds when applied to the self-identified stage of adoption of librarians?

Results of Cross Tabulations

Each of the five attributes of Everett Roger's Diffusion Theory (trialability, advantage, compatibility, complexity, and observability) were cross tabulated and compared to the participants' self-identified stages of adoption. Each attribute was addressed through seven questions which were unidentified to the participants in the survey (see all questions with corresponding attributes in the survey order in Appendix C and labeled by attribute in Appendix D).

Example questions that present findings of each attribute are given, along with examples of comments from survey participants. In discussing findings relating to each attribute addressed, the question for that attribute will be given first, along with a table and bar graph. All of the questions were examined in comparison with the self-identified stages of adoption of the survey participants. Of the 66 participants, 58 completed the survey and self-identified themselves in the following stages of Rogers' Diffusion Theory: Knowledge n=12, Persuasion n=4, Decision, n=4, Implementation n=15, and Confirmation n=23 (see table 4.1.) For each attribute, the seven questions were cross tabulated with the self-identified stage of adoption of the survey participants.

Table 4.1. Self-identified stages of adoption by survey participants.

Self-Identified Stages of Adoption N=58				
Knowledge	Persuasion	Decision	Implementation	Confirmation
N=12	N=4	N=4	N=15	N=23

Trialability

According to Rogers' Diffusion Theory, trialability refers to the degree in which an innovation can be tried or experimented with on a limited basis. To address this attribute, the following seven questions dealt with the initial trial period or the ease of experience upon entering Second Life or during the initial stages of exploration. The questions were asked in random order without attribute labeling.

Trialability question 1: *When I first learned about Second Life (SL), it was easy to "try it out."*

Table 4.1.1. Trialability question 1

Trialability1 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementation (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understanding of virtual worlds in libraries)
Trialability1	A. Strongly disagree			25.0%	13.3%	8.7%	8.6%
	B. Disagree	25.0%	50.0%	25.0%	26.7%	43.5%	34.5%
	C. Neutral	16.7%	25.0%		13.3%	13.0%	13.8%
	D. Agree	33.3%	25.0%	50.0%	40.0%	21.7%	31.0%
	E. Strongly agree	25.0%			6.7%	13.0%	12.1%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: The percentages are for each self-identified stage of adoption and not the entire group of participants. The column on the far right shows the totals for all.

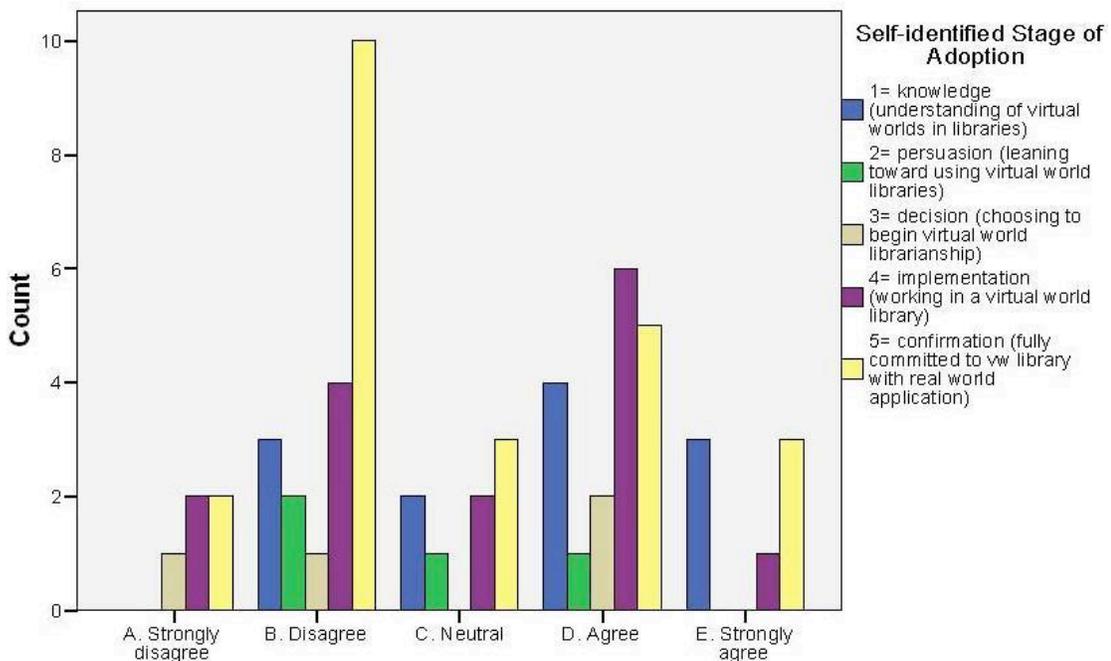


Figure 4.1.1. Trialability question 1

Results clearly show that the initial stages of the virtual world experience were not easy for many of the participants, regardless of the self-identified stage of adoption. Over half of every group (self-identified stage of adoption) disagreed with the statement that Second Life was easy to "try out" in Trialability question 1.

In the space designated for comments, one participant wrote, "Like all software, learning how to navigate, communicate and interact was a matter of practice. Finding a mentor in virtual worlds proved to be a boon because I could learn all the short cuts. Even more importantly, a mentor (a librarian in disguise) showed me how to search, how to find people, how to communicate with people in world, and where to go." Another stated, "Bandwidth limitations, hardware configurations, and repeated "crashing" made navigation difficult initially." And yet another said, "I first came into SL in 2007 and was completely lost. I had no idea what I was doing or what there was to do except it looked like I was supposed to search for something. I couldn't even figure out how to fly. I left and 6 months later was talked into coming back by a RL [real life] friend. This time my friend helped me and I've been here ever since."

Clearly, there is a learning curve for many individuals without prior experience in gaming. Those who found Second Life easy to "try out" gave some examples of prior knowledge in gaming worlds and scored more favorably on trialability (see fig. 4.1.1). One participant explained, "I was familiar with a wide variety of computer and video games, so learning to move and interact in SL was very familiar and easy." Trialability question 2: *I was able to test my role as a virtual world librarian through pilot projects.*

Table 4.1.2. Trialability question 2

Trialability2* Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Trialability2	Strongly disagree	16.7%	25.0%	25.0%	13.3%		10.3%
	Disagree	25.0%	25.0%		13.3%		10.3%
	Neutral	16.7%		25.0%	26.7%	30.4%	24.1%
	Agree	41.7%		25.0%	40.0%	21.7%	31.0%
	Strongly agree		25.0%	25.0%	6.7%	47.8%	24.1%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

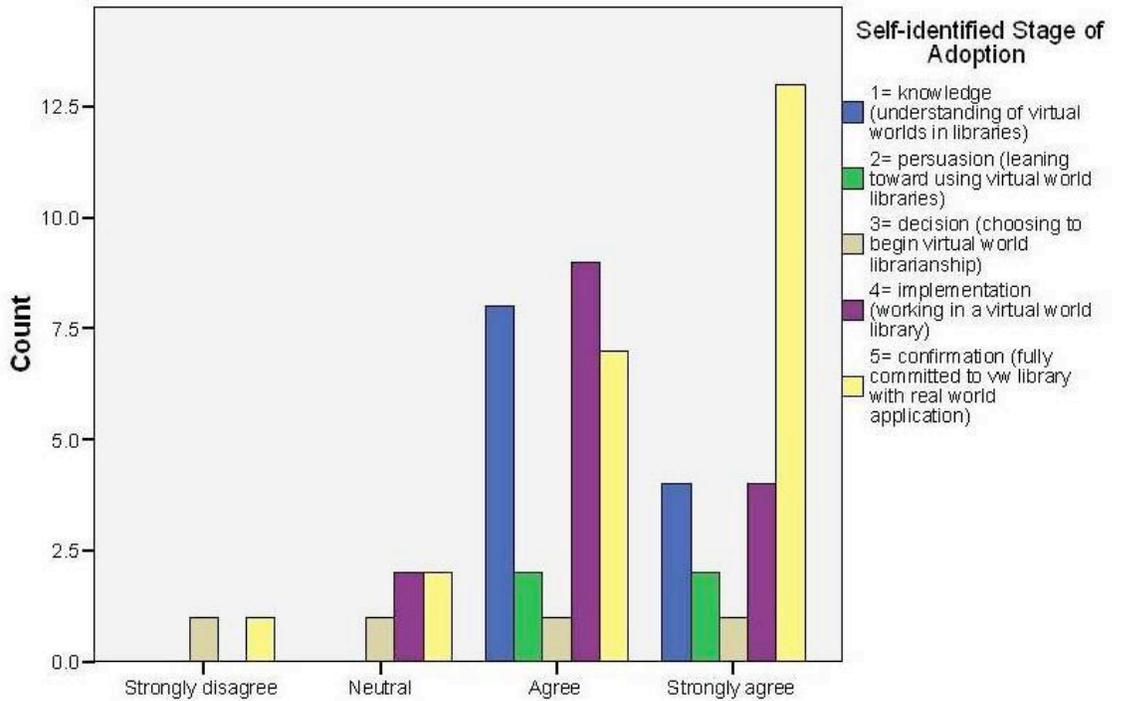


Figure 4.1.2. Trialability question 2

Clearly librarians found opportunities to test the role of librarianship through virtual world projects with 55% agreeing or strongly agreeing. One participant wrote, "The running of a SL community library was a pilot project to test my ability to function usefully as a virtual world librarian." While project opportunities within the role of librarianship pertain to trialability, these projects may not be perceived as *easy* to perform initially, which means the wording of this question may have lacked precise language consistent with the attribute. Testing the role as a professional could be interpreted as compatibility with the profession rather than trialability. Rogers' defines trialability as "the degree to which an innovation may be experimented with on a limited basis" or how easily it may be "tried out" (Rogers, 2003. 258). The fact that a librarian felt able to test the role of librarianship does not automatically infer ease of trialability with the innovation. Perhaps the emphasis in this question should have been placed on testing the innovation rather than the professional role.

Trialability question 3: *I was able to develop a sense of trust with others through virtual world experimentation.*

Table 4.1.3. Trialability question 3

Trialability3 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Trialability3	Strongly disagree			25.0%		4.3%	3.4%
	Neutral			25.0%	13.3%	8.7%	8.6%
	Agree	66.7%	50.0%	25.0%	60.0%	30.4%	46.6%
	Strongly agree	33.3%	50.0%	25.0%	26.7%	56.5%	41.4%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

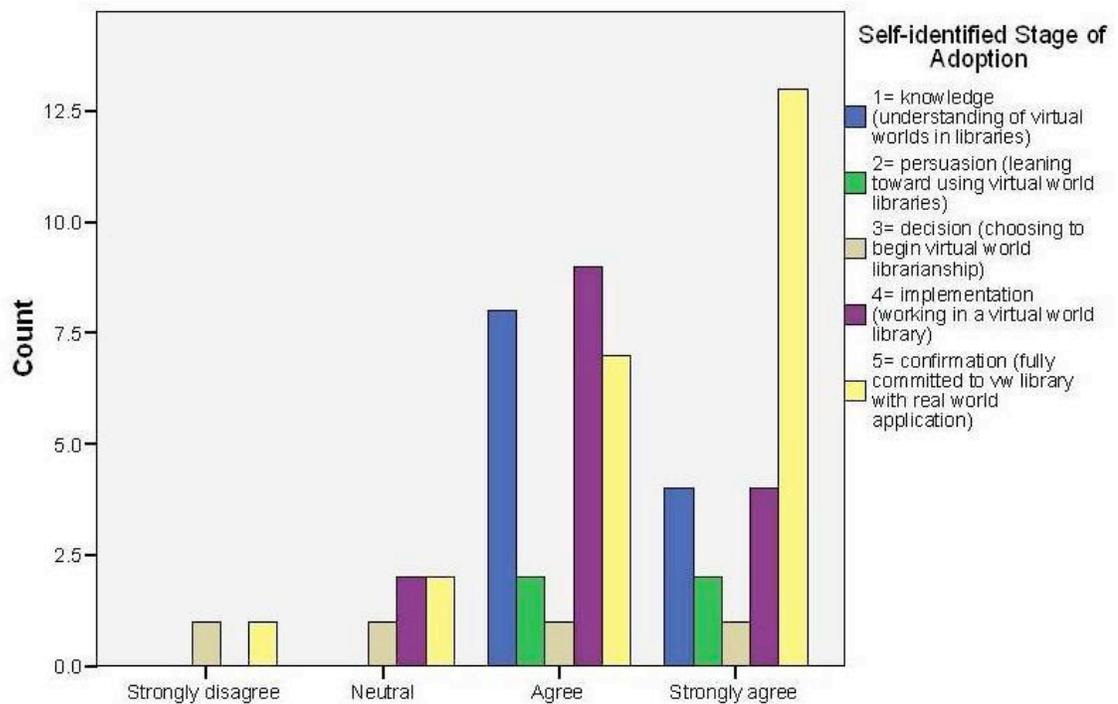


Figure 4.1.3. Trialability question 3

Nearly all of the librarians (88%) were able to develop a sense of trust through interaction with others. One participant wrote, "It didn't take much to find out who was who - I can't think of any librarians I met who kept their real life identities a secret - so it

wasn't so much a matter of trusting avatars met in SL as in trusting other librarians."

Another stated, "Working with others in SL, on the magazine, paper, and my other projects, I feel that trust was developed between myself and others."

Several compared relationships with those formed in the physical world. For example, one said, "Depends upon the individual avatar. This is no different than RL. Some people you instinctively trust. I have found the Info Island Archipelago to be much more trustworthy in SL in general."

Answers to this trialability question might have been strengthened by the clarification of the key words "ease of use" or "initial use" in order to accurately measure the attribute. The comments are insightful regarding the development of trust (as based on the CoI Survey) but may not accurately measure the experimental stage. Most of the participants' remarks focused on building trusting relationships but those may not have been "easy" during the initial stage. For example, one person stated, "I think at first I felt a little scared of SL because of the bad media representation. But the friendliness of the librarians in SL really overcame that, and I have made lots of friends here. It is a very safe interface, because other than griefers (and you can TP out, or mute them) nothing can be done to you that you don't consent to."

Trialability question 4: *My early involvement gave me freedom to disagree and express myself honestly inworld.*

Table 4.1.4. Trialability question 4

Trialability4 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Trialability4	Disagree	8.3%				13.0%	6.9%
	Neutral	16.7%		25.0%	33.3%	13.0%	19.0%
	Agree	50.0%	50.0%	75.0%	40.0%	30.4%	41.4%
	Strongly agree	25.0%	50.0%		26.7%	43.5%	32.8%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

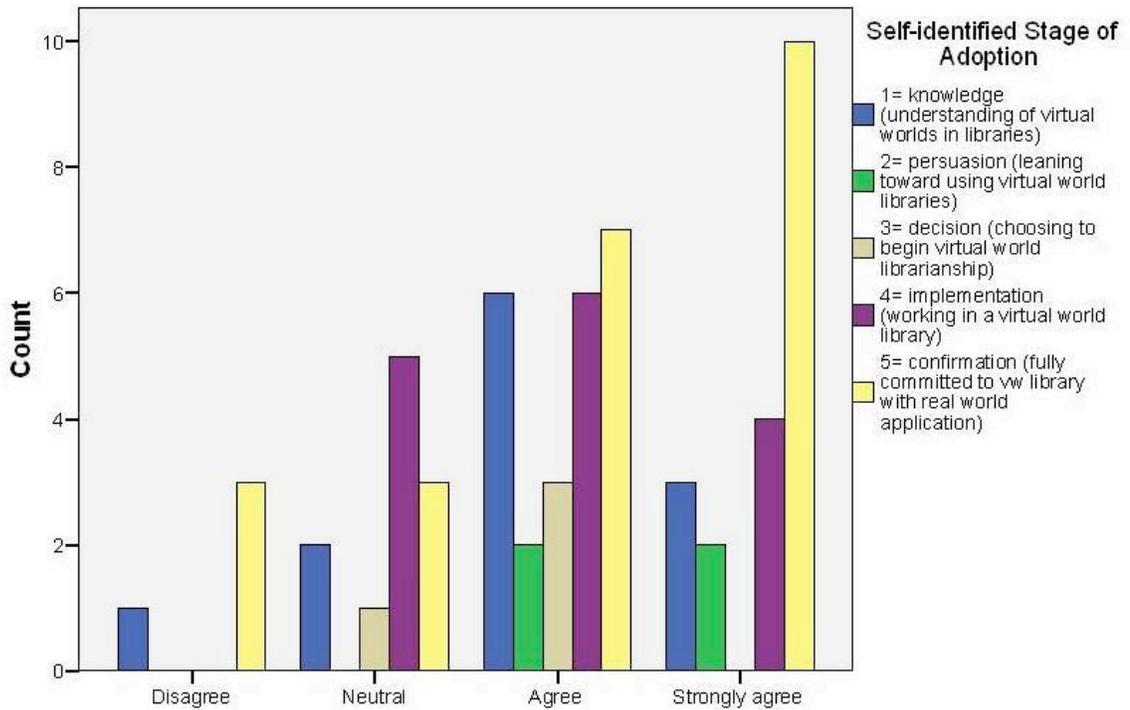


Figure 4.1.4. Trialability question 4

Participants' responses about freedom of expression in the virtual world were varied. One respondent put it this way, "I've expressed myself more in Second Life than I have in 47 years of real life." Yet another said, "I have found that I express myself inworld much as I would do in a rl environment. You need to be polite, understand where the other person is coming from. I would say I was no more or less honest in sl than in rl, other than my avatar's appearance."

Once again, the attribute of trialability was difficult to address with clarity. One participant interpreted the phrase "my early involvement" in the context of early adoption rather than personal trial period of time. That participant stated, " I don't know if early involvement makes a difference in this area, though I guess this is the case with any area where some have more experience and then express stronger opinions."

Trialability question 5: *Experimentation increased my interest in learning virtual world skills.*

Table 4.1.5. Trialability question 5

Trialability5* Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Trialability5	Agree	33.3%	50.0%		20.0%	39.1%	31.0%
	Strongly agree	66.7%	50.0%	100.0%	80.0%	60.9%	69.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

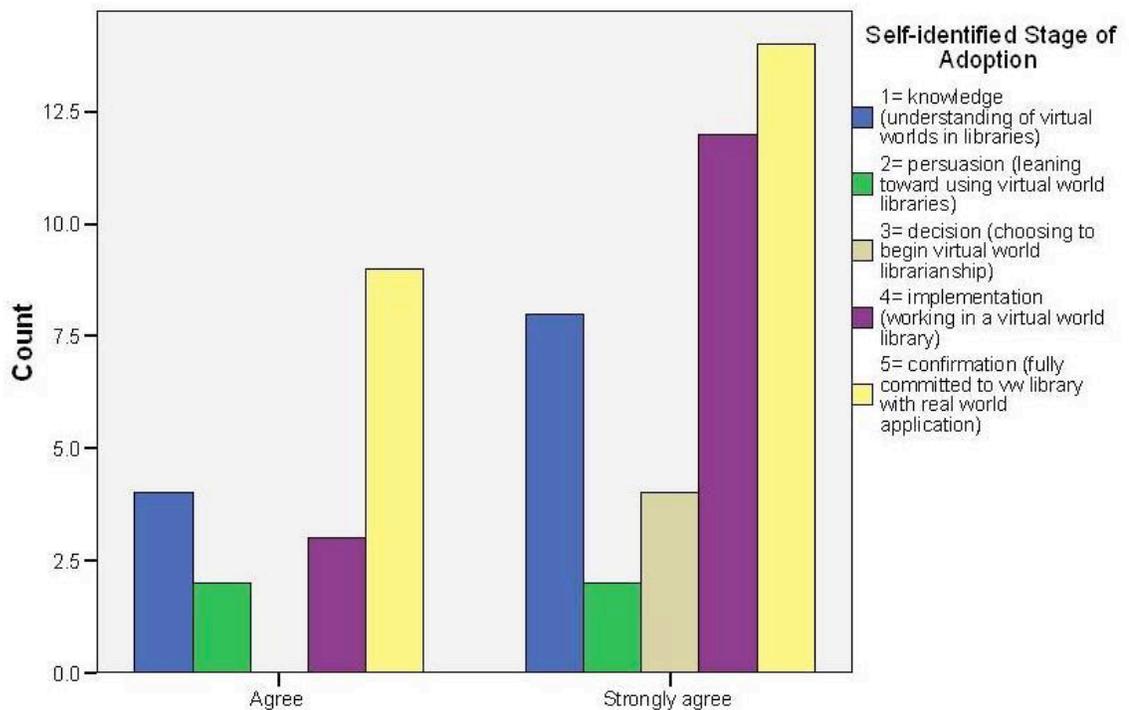


Figure 4.1.5. Trialability question 5

Librarians at all self-identified stages of adoption agreed that interest increased through trying out the virtual world experience (see fig. 4.1.5.). One participant said, “The more I "played" with changing clothes, hairstyles, furniture in my house, etc, the more I learned the basics of moving objects.”

Trialability question 6: *My initial trial period in SL piqued my curiosity.*

Table 4.1.6. Trialability question 6

Trialability6 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Trialability6	Disagree	8.3%				6.7%	3.4%
	Neutral	16.7%	25.0%			13.0%	10.3%
	Agree	41.7%			33.3%	8.7%	20.7%
	Strongly agree	33.3%	75.0%	100.0%	60.0%	78.3%	65.5%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

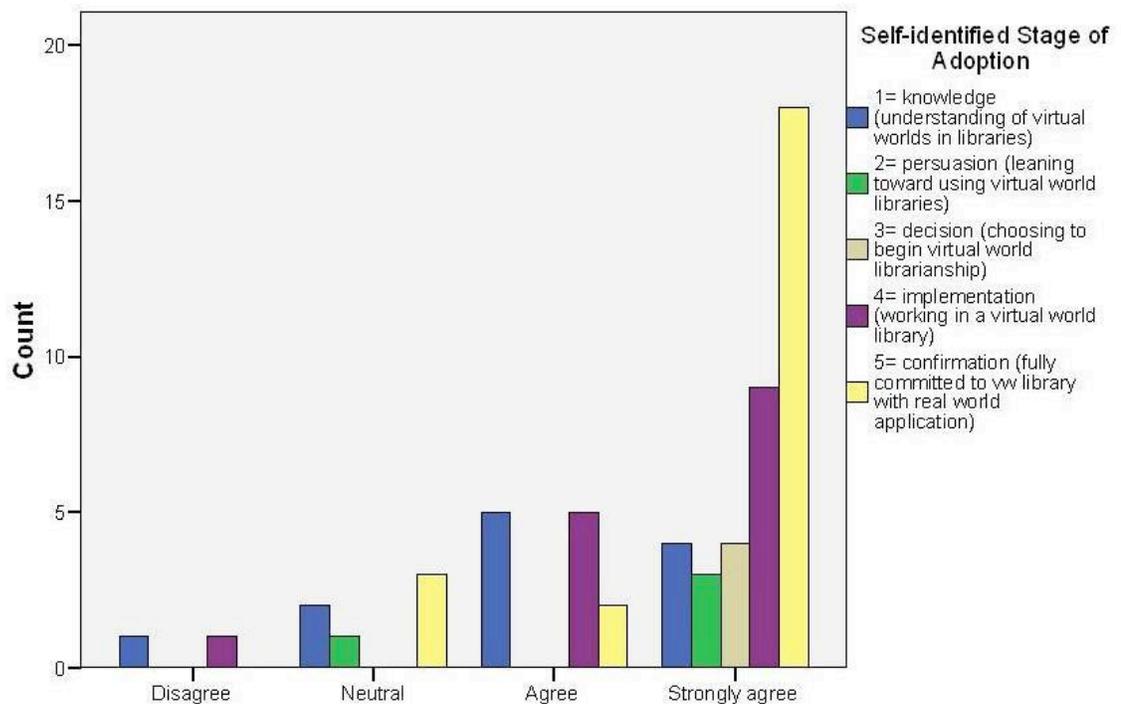


Figure 4.1.6. Trialability question 6

Nearly all individuals found that the initial trial period piqued their curiosity.

Interest and curiosity played a role in the attribute of trialability, even though many found

he trial period difficult (see fig. 4.1.6.). This frustration regarding trialability was illustrated with the following example, “While I agree with this, I was also frustrated after my initial trial period because of how overwhelming some of the skills and tasks seemed to be. However, I was also persistent and stubborn enough to continue, and I'm glad I did.”

Trialability question 7: *I tested a variety of information sources to explore potential library issues in a virtual environment.*

Table 4.1.7. Trialability question 7

Trialability7 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Trialability7	Strongly disagree	8.3%			6.7%		3.4%
	Disagree	16.7%			6.7%	8.7%	8.6%
	Neutral	33.3%	50.0%	25.0%	33.3%	21.7%	29.3%
	Agree	25.0%	25.0%	25.0%	33.3%	34.8%	31.0%
	Strongly agree	16.7%	25.0%	50.0%	20.0%	34.8%	27.6%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

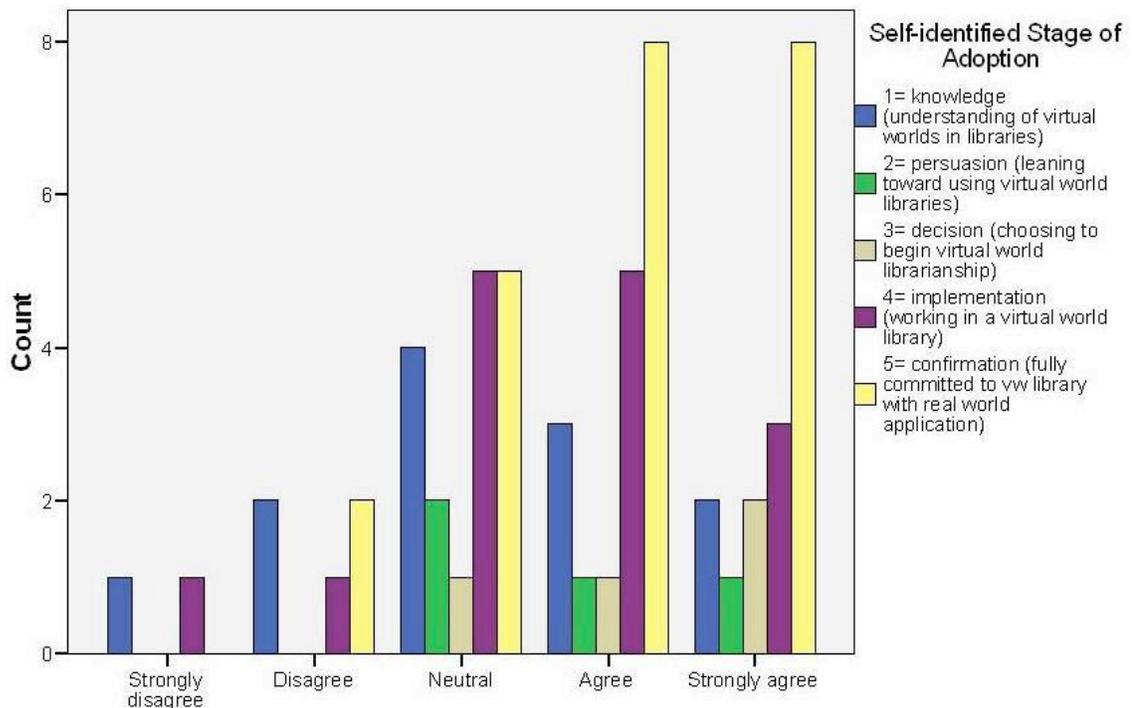


Figure 4.1.7. Trialability question 7

Several participants commented that they did not understand this question. One wrote, "I did listen to how librarians would interact with each other in meetings, and social gatherings. I don't know if that is a "test" per se." Another asked, "I'm not sure I know what you mean by this question. Did you mean, researching in advance to try to discover these issues before entering a virtual environment? If so, the answer is No, not prior to entering SL, though of course, after entering SL, my co-authors and I did quite a bit of research into publications about SL in order to prepare our bibliography for RSR."

Data analysis summary of trialability. Rogers' trialability attribute was not found to be a strong contributing factor leading to the adoption of virtual worlds, but many individuals shared examples of persistence to overcome obstacles regardless of finding

the initial period difficult. Interpretations of the trialability questions varied which led to the conclusion that the attribute should be studied through more specific language terms.

Relative Advantage

Relative advantage, according to Diffusion Theory, refers to the benefits and advantages understood by adopters. The seven following questions indicate the participants’ perceptions of the benefits and advantages of virtual worlds as experienced by librarians.

Relative advantage question 1: *I believe my work in SL benefits the profession of librarianship.*

Table 4.2.1. Relative advantage question 1

RelativeAdvantage1 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementation (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understanding of virtual worlds in libraries)
RelativeAdvantage1	Disagree	8.3%			6.7%	4.3%	5.2%
	Neutral	41.7%	25.0%		6.7%	4.3%	13.8%
	Agree	50.0%	50.0%	25.0%	46.7%	30.4%	39.7%
	Strongly agree		25.0%	75.0%	40.0%	60.9%	41.4%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

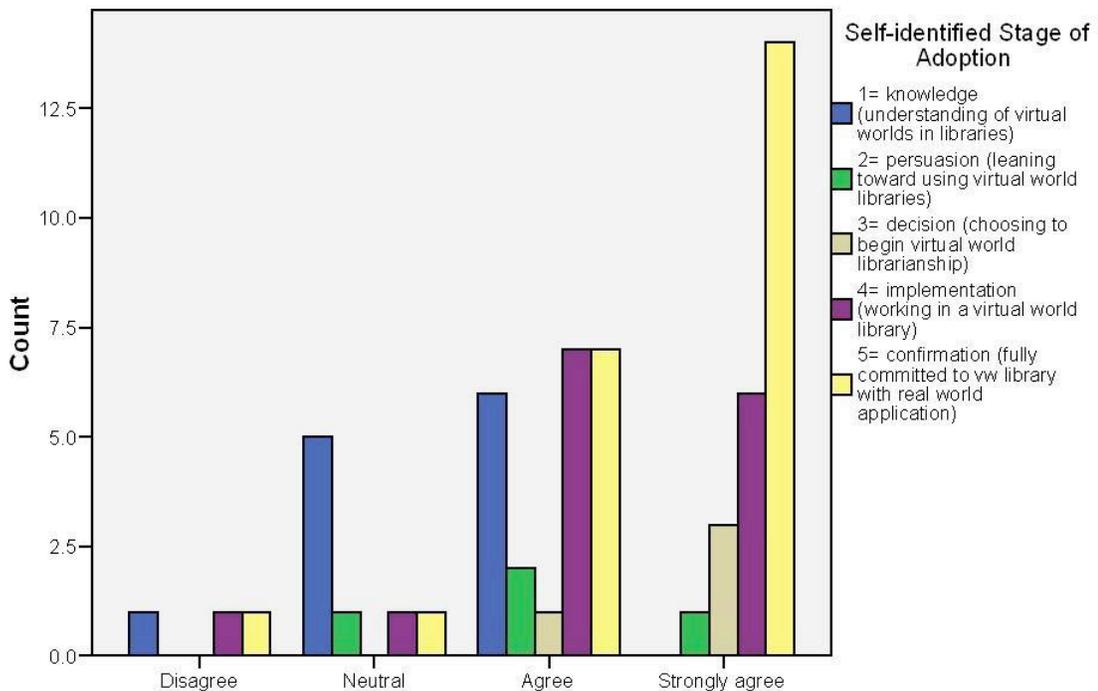


Figure 4.2.1. Relative advantage question 1

Participants at all levels (but particularly those who are fully committed to virtual librarianship) agree that their work in a virtual world benefits the profession (see table 4.2.1.). One of the founders of the Community Virtual Library contributed, “Over the years we have provided too many library services in this virtual world to list - but chief among them would be the core services of providing access to resources, reference, and programming that has centered around information. We have learned much and like real life libraries we have been dealt a blow by the economy. If we accomplished nothing

else, we have shown that we can provide library services in new and creative ways to global audiences.”

Relative advantage question 2: *Major benefits of virtual world librarianship include gaining resources and information delivered in unique modes.*

Table 4.2.2. Relative advantage question 2

RelativeAdvantage2* Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
RelativeAdvantage2	Strongly disagree			25.0%			1.7%
	Disagree	16.7%			6.7%	4.3%	6.9%
	Neutral	8.3%			6.7%		3.4%
	Agree	41.7%	75.0%	50.0%	60.0%	21.7%	41.4%
	Strongly agree	33.3%	25.0%	25.0%	26.7%	73.9%	46.6%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

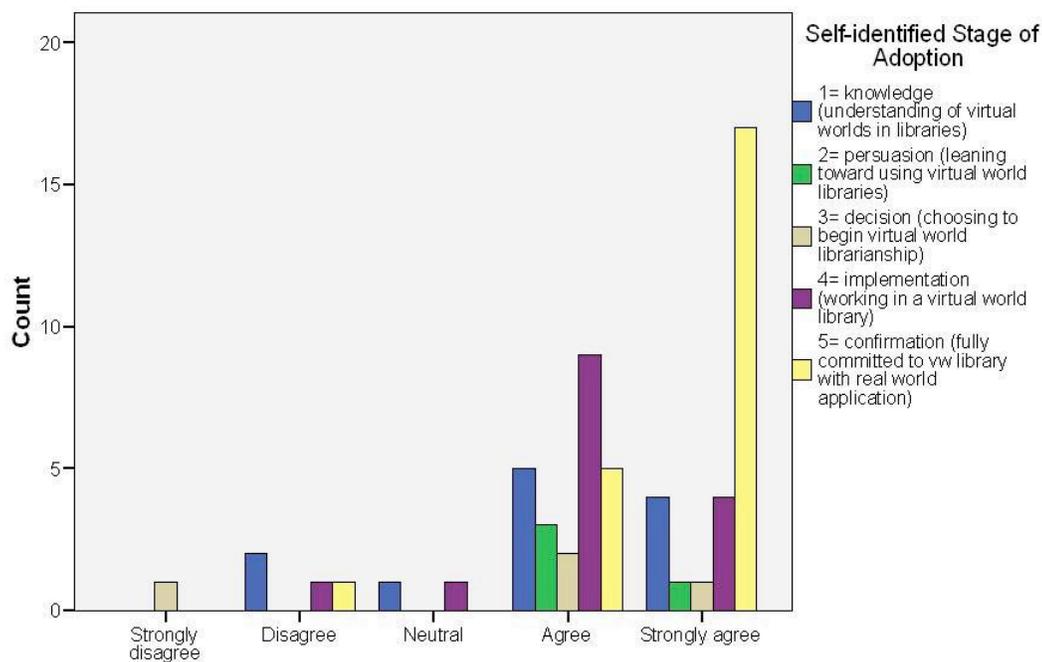


Figure 4.2.2. Relative advantage question 2

Most respondents believe resources delivered in this mode are benefits. One librarian illustrated the advantage of immersing patrons in simulated environments by stating, “As I mentioned earlier, historical exhibits where notecards and accurate builds offer unique glimpses into the past, other exhibits from many fields including literature, medical, and science are just as informative.” Another librarian discussed the ability to assist information seeking individuals across distance by commenting, “Virtual world librarianship has no boundaries. I can provide service to someone in Australia. I can do that from my home or my office.”

Relative advantage question 3: *I feel that virtual world communication is an excellent medium for social interaction.*

Table 4.2.3. Relative advantage question 3

RelativeAdvantage3 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
RelativeAdvantage3	Strongly disagree			25.0%			1.7%
	Disagree					4.3%	1.7%
	Neutral	8.3%					1.7%
	Agree	16.7%	25.0%	25.0%	33.3%	21.7%	24.1%
	Strongly agree	75.0%	75.0%	50.0%	66.7%	73.9%	70.7%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

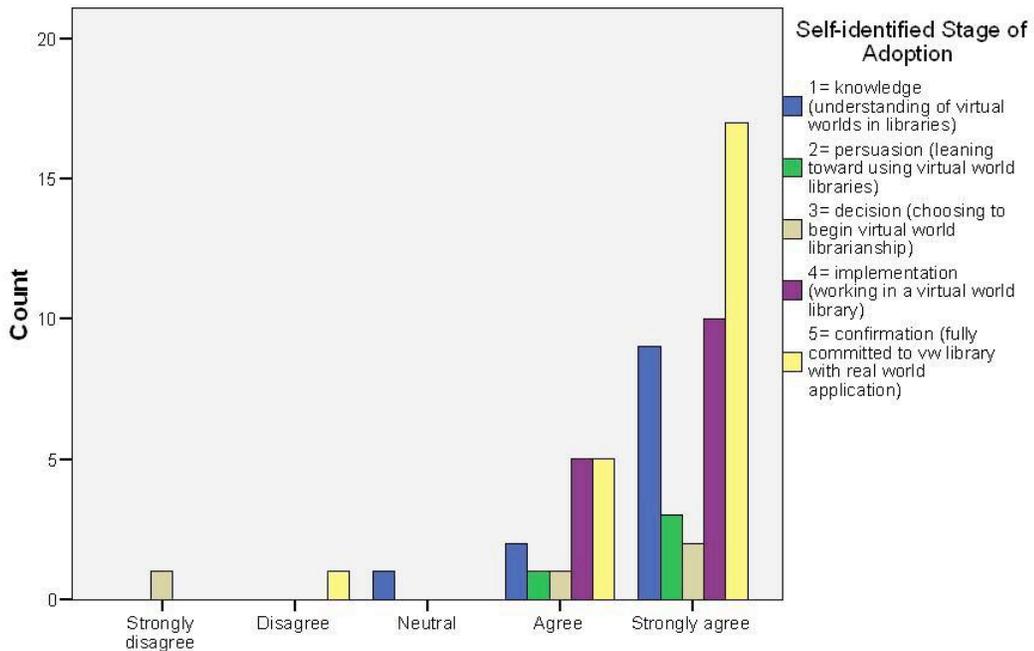


Figure 4.2.3. Relative advantage question 3

Comments and examples of social interaction included the phrases "free to express myself", "less inhibited" and "braver" than in the physical world. One illustrated

this freedom by saying, "The anonymity of SL tends to let some folks feel much freer to be interactive."

A respondent expressed, "There is something about having an avatar representation that helps. I know I feel my avatar is an extension of myself. I cloth myself as I wish I could in real life and am able to act as I would in real life. I believe that an avatar, whether human form, imaginary, furry, tiny, etc. helps to give a fuller picture of the person and gives cues that a text-only social interaction does not."

One participant explained, "Social interaction is critical to creating a vital online community, and VW communication tools allow people to choose a preferred mode as well as meet new colleagues from around the world. I regularly attend an information literacy research seminar on the University of Sheffield's SL island with participants from the UK and US. This international group of librarians and educators provides perspectives and insights on pedagogy and methods from different parts of the world that informs my teaching and research."

Relative advantage question 4: *Brainstorming and collaborating with others inworld was beneficial in finding solutions.*

Table 4.2.4. Relative advantage question 4

RelativeAdvantage4 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementation (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understanding of virtual worlds in libraries)
RelativeAdvantage4	Neutral		25.0%			4.3%	3.4%
	Agree	33.3%	75.0%	50.0%	26.7%	17.4%	29.3%
	Strongly agree	66.7%		50.0%	73.3%	78.3%	67.2%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

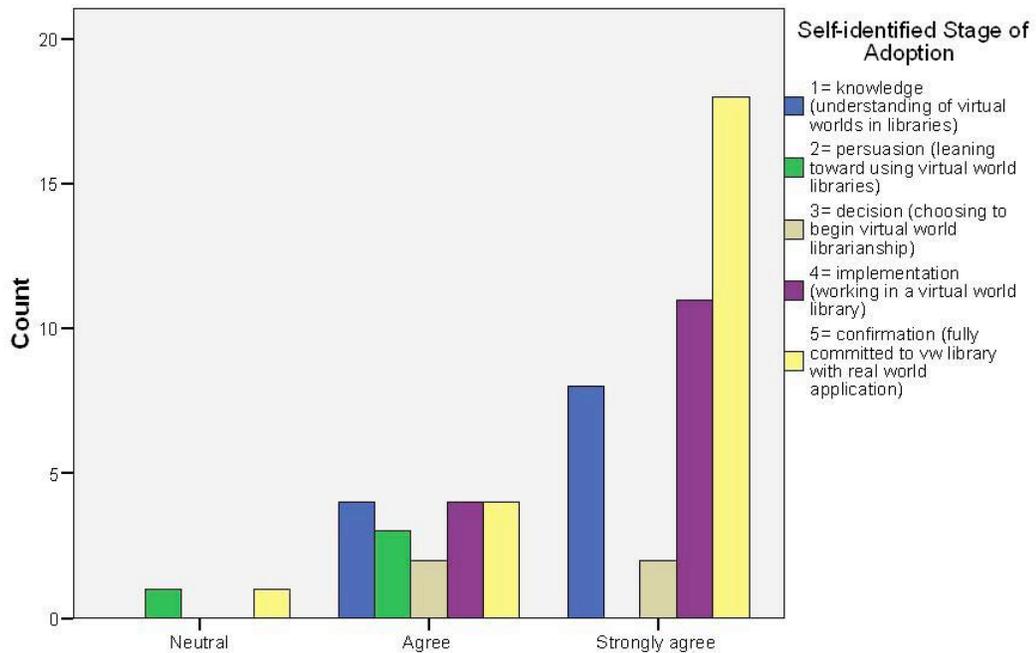


Figure 4.2.4 Relative advantage question 4

Strong evidence of virtual world collaboration was documented in answers and examples were shared through additional comments. One librarian wrote, "This is one of

the major benefits of Second Life...to be able to brainstorm and collaborate with people from around the world who have tried different approaches and explored other options. Also the librarians I've met in Second Life tend to be the innovators, risk takers and early adopters so you can learn a lot from them."

Another example of collaboration across distance was shared. The respondent said, "One of my earliest revelatory experiences was doing some interior design with two other librarians in our library in SL. The three of us were separated geographically, but we were there together in SL working on a project - moving furniture and making decisions about what to include in our new environment. I never had any doubt that Being There was the same thing as being anywhere else with others."

The relative advantage attribute was stressed by this comment, "Collaborating with others is the most important aspect of SL." Clearly, interaction through brainstorming and collaboration was seen as an advantage of the medium.

Relative advantage question 5: *Inworld (in SL) discussions were valuable and helped me appreciate different perspectives.*

Table 4.2.5. Relative advantage question 5

RelativeAdvantage5* Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementation (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understanding of virtual worlds in libraries)
RelativeAdvantage5	Neutral			25.0%	6.7%		3.4%
	Agree	41.7%	75.0%	50.0%	33.3%	34.8%	39.7%
	Strongly agree	58.3%	25.0%	25.0%	60.0%	65.2%	56.9%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

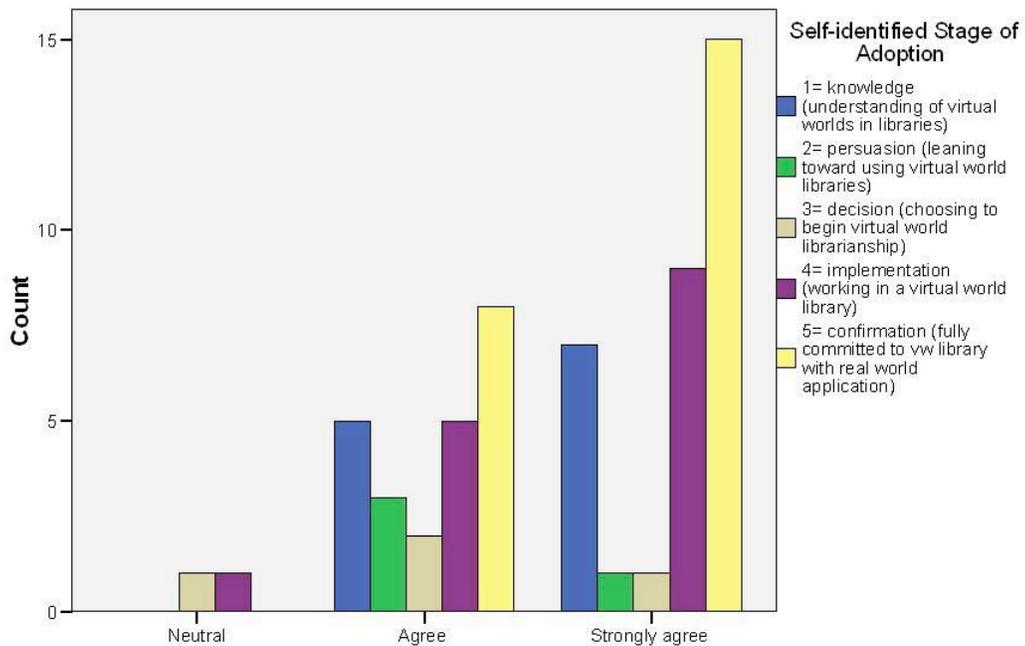


Figure 4.2.5. Relative advantage question 5

All of the participants agree that inworld discussions are valuable and provide diverse perspectives. One stated, "The ability to "chat" with others in a meeting without disrupting the flow of a main speaker definitely aids in collaboration too."

Another participant found text chat less effective than the use of voice, by stating, "Sadly, almost all formal discussions are conducted in text chat, a medium that I find tedious and disjointed. It is nice to see other's perspectives, and we have gathered new ideas from others, but it is more often in private conversations or in watching what is going on."

Relative advantage question 6: *I believe virtual worlds provide advantages beyond an online class for education and information seeking individuals.*

Table 4.2.6. Relative advantage question 6

RelativeAdvantage6 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understand ing of virtual worlds in libraries)
RelativeAdvantage6	Neutral	8.3%				4.3%	3.4%
	Agree	25.0%	25.0%	25.0%	33.3%	8.7%	20.7%
	Strongly agree	66.7%	75.0%	75.0%	66.7%	87.0%	75.9%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

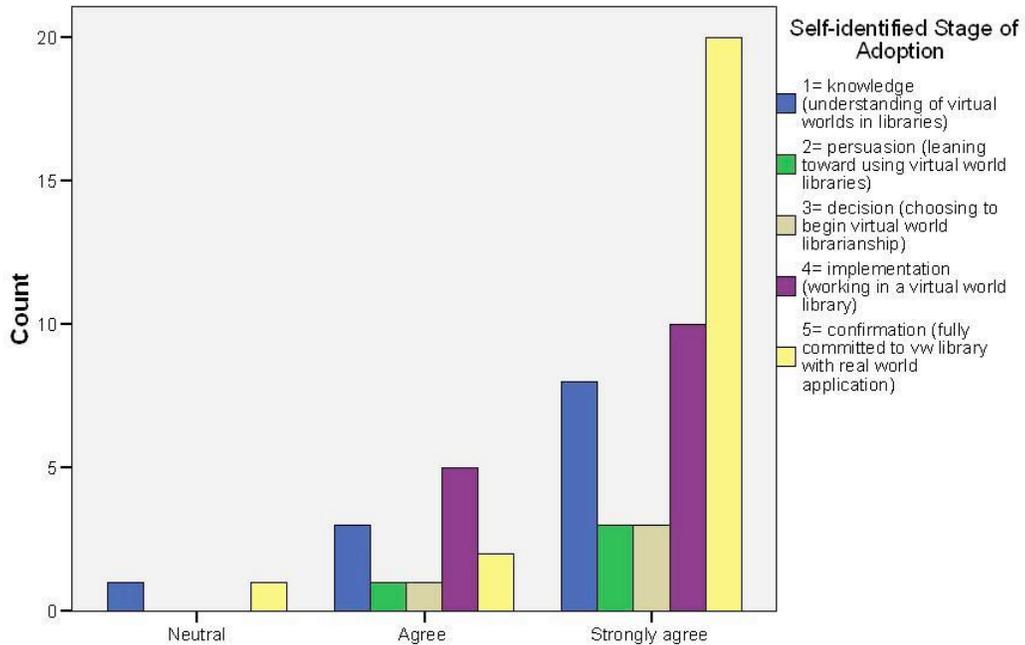


Figure 4.2.6. Relative advantage question 6

All participants in the survey found advantages in the use of virtual worlds for education and information seeking individuals (see table 4.2.6.). One participant explained what the virtual world offers beyond the online classroom, stating, “What virtual worlds provide is a sense of shared presence. When I attend a webinar or an online meeting, I feel like I'm sitting alone listening and talking with others who are far away. This is true even if we are using video cameras. When I attend a meeting on SL, I feel like I'm in the same room as these people.”

Numerous examples were given by one respondent that validate the relative advantage of virtual worlds beyond the traditional or online classroom. The participant wrote:

The list is long: * Personal and professional networking * Simulated scenarios to improve skills * Learning through exploring or gaming * Language learning by talking to native speakers (you can even pick up some words with a translator hud use) * Working in culturally diverse communities * Gaining international perspectives * Learning more about yourself, your interests, and your faults (these tend to be exaggerated in the virtual world and are therefore more noticeable) * Pursuing intellectual interests that were not pursued in First Life but for which you have an interest; professional opportunities exist to work on projects for which normally a degree is required.

Relative advantage question 7: *The knowledge gained in Second Life benefits my work or other activities.*

Table 4.2.7. Relative advantage question 7

RelativeAdvantage7 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understand ing of virtual worlds in libraries)
RelativeAdvantage7	Neutral	33.3%		25.0%		4.3%	10.3%
	Agree	50.0%	75.0%	25.0%	46.7%	26.1%	39.7%
	Strongly agree	16.7%	25.0%	50.0%	53.3%	69.6%	50.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

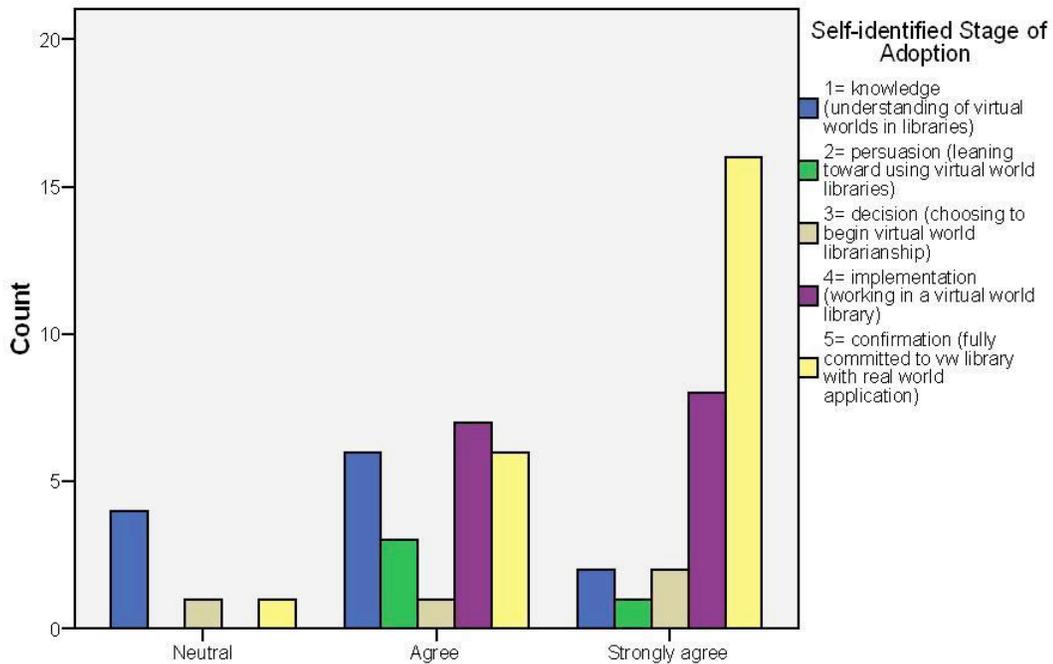


Figure 4.2.7. Relative advantage question 7

All of the survey participants use knowledge gained through virtual world experience for work and other physical world experiences. (see fig. 4. 2.7.) Examples of using knowledge gained was expressed by this example, “New and strong collegial relationships. Contact with people I would never have met otherwise. Thinking about services in a different place.”

Another survey participant wrote, “Just about everything I do as a librarian at my university library in the physical world has benefited from my work and involvement in the virtual world.”

Data analysis summary of relative advantage. Participants answered favorable for all questions dealing with the relative advantage attribute (see table 4.2.7.). Clearly, the

benefits and advantages of virtual worlds were strongly embraced by participants at all self-identified stages of adoption. Rogers’ relative advantage attribute was found to be a strong contributing factor contributing to the adoption of virtual worlds.

Compatibility

Compatibility, according to Rogers’ Diffusion Theory, indicates the degree to which an innovation is perceived as being consistent with the exiting values, past experiences, and needs of potential adopters. The next seven questions indicate the participants’ perceptions of the compatibility of virtual worlds to the profession of librarianship.

Compatibility question 1: *I entered Second Life for professional reasons.*

Table 4.3.1. Compatibility question 1

Compatibility1 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementation (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understanding of virtual worlds in libraries)
Compatibility1	A. Strongly disagree	16.7%		25.0%	13.3%		8.6%
	B. Disagree	16.7%	50.0%	25.0%			8.6%
	C. Neutral	8.3%				17.4%	8.6%
	D. Agree	50.0%	25.0%	50.0%	53.3%	13.0%	34.5%
	E. Strongly agree	8.3%	25.0%		33.3%	69.6%	39.7%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

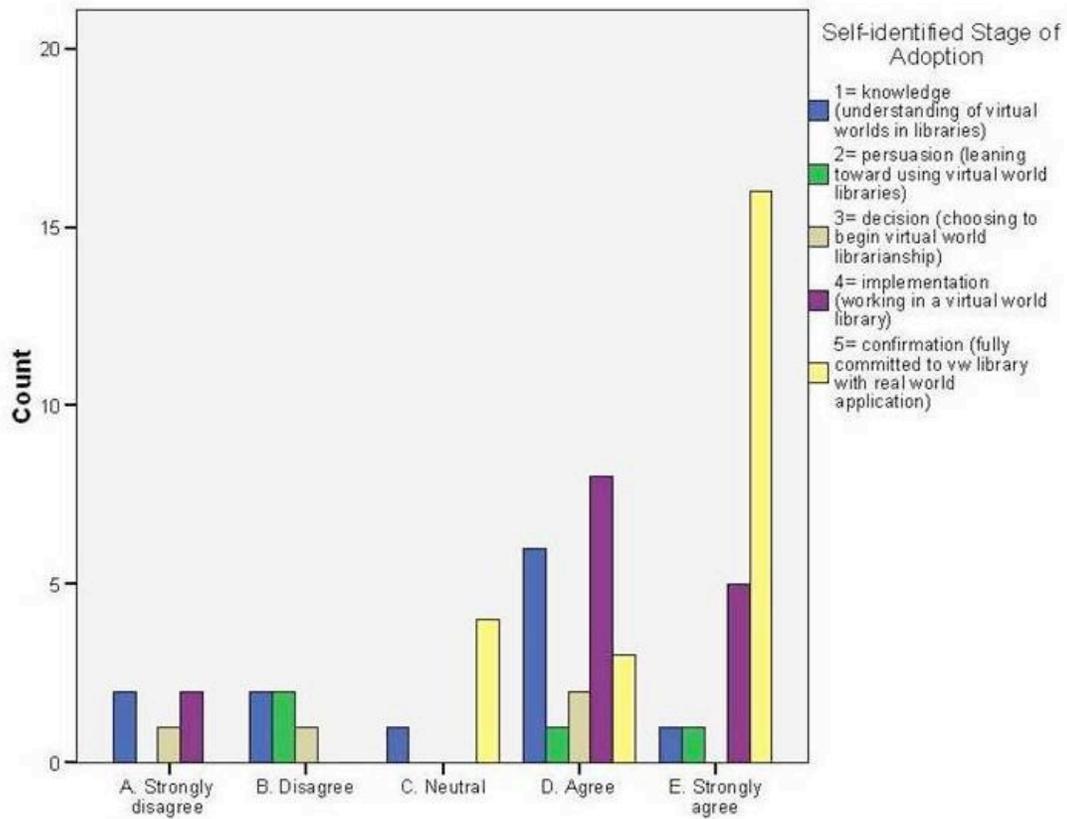


Figure 4.3.1. Compatibility question 1

Interestingly, all participants who are firmly committed to the adoption of virtual worlds entered for professional reasons (see fig. 4.3.1). One wrote, “I had been doing virtual reference using a chat application. I was fascinated by the idea of being able to do virtual reference and see the patron.” Another stated, “My boss at the time thought it would be a great way to learn about virtual reality and the possibilities for libraries and educators.”

Another example of professional reasons was shared in the following:

I learned about Second Life at a Librarian's conference...there was a workshop about it. I was already familiar with chat and distance learning and the informational and educational possibilities in Second Life is actually what drew me in. The idea that information could be shared, modeled and expressed in totally new and compelling ways, and that distance, language and culture would be less of a barrier to learning...was very intriguing for me. I still think the possibilities of this have only been lightly touched. I also think that the Linden decision to charge non-profits full price was a terrible one and has already resulted in a loss of content and quality of life in SL.

Clearly, the “informational and educational possibilities expressed by this respondent illustrate compatibility with the library profession. Concerns about rising costs (charges to non-profits) are outside the scope of this dissertation; however, this comment is a reminder that Second Life is not the only virtual world available to date and suggests that librarians and educators may look elsewhere.

Compatibility question 2: *I spend more time in SL for professional reasons than for other reasons.*

Table 4.3.2. Compatibility question 2

Compatibility2* Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Compatibility2	Strongly disagree	41.7%	25.0%	25.0%	13.3%	8.7%	19.0%
	Disagree	25.0%	25.0%	25.0%	60.0%	30.4%	36.2%
	No opinion			50.0%	13.3%	17.4%	13.8%
	Agree	25.0%	25.0%		6.7%	13.0%	13.8%
	Strongly agree	8.3%	25.0%		6.7%	30.4%	17.2%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

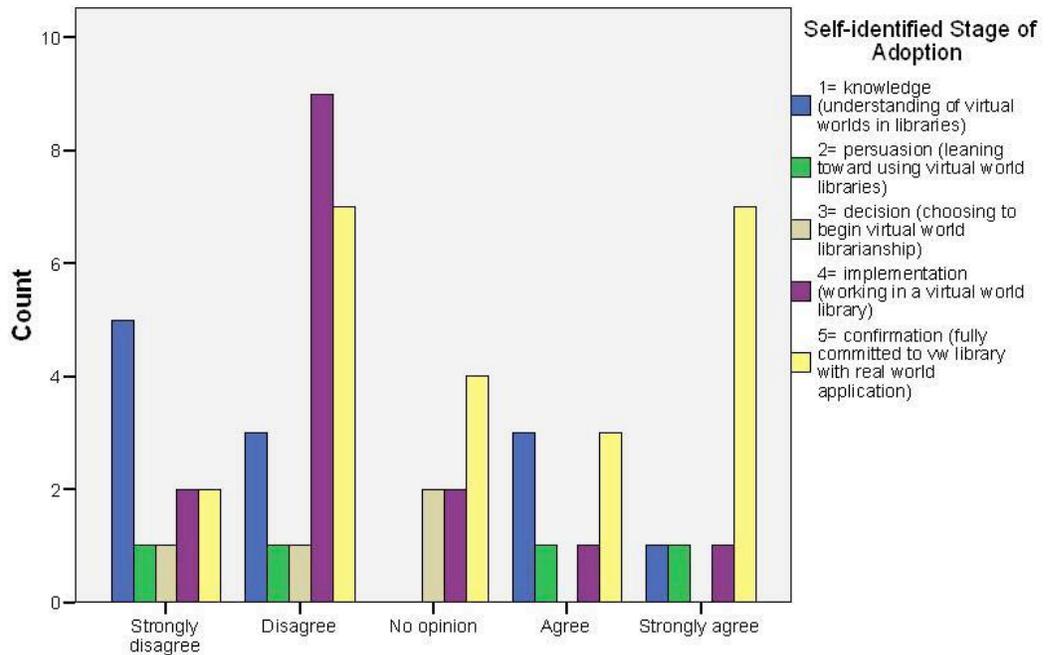


Figure 4.3.2. Compatibility question 2

Another interesting factor regarding compatibility shows variety in the time spent for different purposes (information literacy or librarianship is definitely not the only purpose). For example, a respondent wrote, “I chose no opinion because right now I divided about half and half my time in SL. I spend time for professional reasons but I found it sparks my creativity. Now I love to create and take photos.” Another said, “It's about 50-50. While I'm in Second Life during my work day, I'm usually not doing anything, as I have Real Life work occupying my time. I'm there 'in-case' I'm needed, kind of like I'm in various IM clients and Twitter as an "as needed" basis.”

Another participant stated:

I've been there for 4 years now, so different time periods balanced differently between professional and personal. Overall, it is balanced between them. But I'll give you examples from throughout those years. Let's see... -I built and developed Harvard College's library presence there (now shut down.) I spoke at inworld conferences about it, gave tours to classes, talked to people from around the world about it. -I worked for a while with Bryan Carter on Virtual Harlem/Monmartre, and worked on the library presence there. There, I also spoke at conferences & workshops, and worked with some of Bryan's students. -I continue to experiment with library things on a site in Cybrary City II On the personal side: -I fell in love there with a man who I then spent 3 years in real life with. But even when we were together in the flesh (so to speak!) we would spend time exploring together. Or meeting there when he was away in real life. -I met a woman who has become my best friend in real life. In world, she does a lot of art curation, so I've met tons of artists in world, and spend time going to their exhibits, and talking to them about their art. -Just talking with friends I've made there, some of whom I now also know in real life, or on FaceBook.

Compatibility question 3: *I believe work as a virtual librarian is in harmony with work in a physical library.*

Table 4.3.3. Compatibility question 3

Compatability3 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total 1= knowledge (understand ing of virtual worlds in libraries)
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	
Compatability3	Strongly disagree	8.3%		25.0%			3.4%
	Neutral	25.0%			26.7%	8.7%	15.5%
	Agree	41.7%	25.0%	50.0%	20.0%	34.8%	32.8%
	Strongly agree	25.0%	75.0%	25.0%	53.3%	56.5%	48.3%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

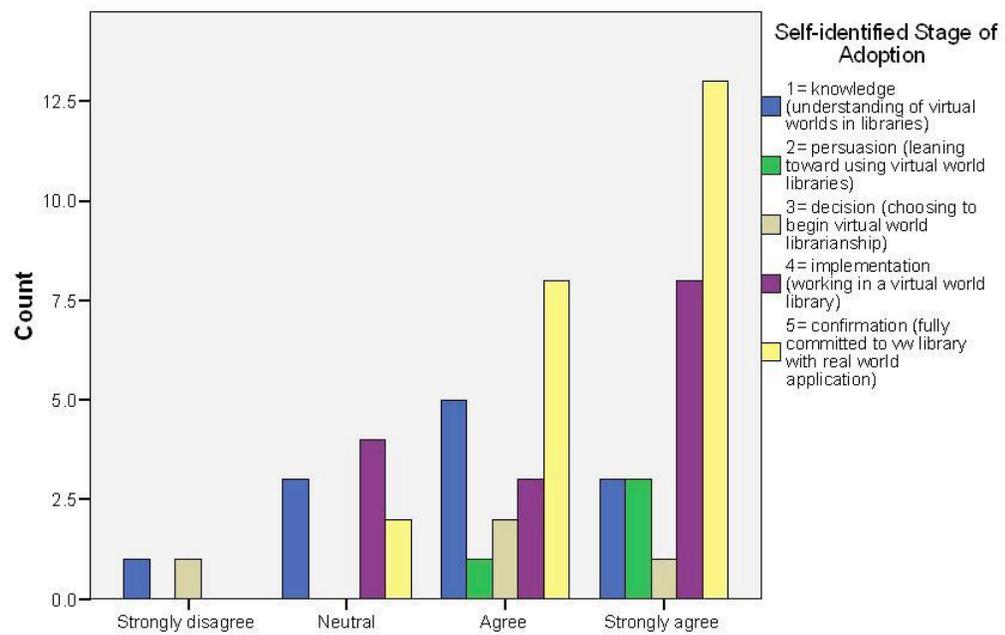


Figure 4.3.3. Compatibility question 3

The data from the survey supports the idea that librarians at all stages of adoption of virtual worlds believe the medium is compatible with the profession with 81% either agreeing or strongly agreeing (see figure 4.3.3.); however, both professional and personal uses are important to many individuals and the line between the two is often blurred based on numerous comments about using the innovation for both professional and personal reasons. Examples of compatibility included a sense of belonging among colleagues, numerous professional events attended, the same type of mentoring one would expect in the physical world, and a respect for professional achievements. One librarian wrote, "Just as digital reference is simply another form of reference that utilizes technology, participation in virtual environments of all kinds is simply an extension and expansion of what we do in a physical library setting."

Examples of use outside of the profession included role-play, attending dances, socializing, shopping for virtual clothes and objects, and relaxing by beautiful virtual places. One participant illustrated the use of a virtual world outside of the profession by saying, "I came for professional reasons and remained for personal reasons, as I got to know the residents and possibilities of Second Life."

Some may argue that this blurry line between the personal and the professional use of virtual worlds makes the compatibility attribute's contribution to adoption questionable. Others may believe that many new media formats, including social networks and online platforms, share the ability to be used for a variety of purposes both personal and professional. The clarity of purpose for any activity and the integrity of a profession are placed upon each individual to determine best practice and professional ethics.

Compatibility question 4: *I served as a mentor to another librarian or colleague in a virtual world.*

Table 4.3.4. Compatibility question 4

Compatibility4 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementation (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understanding of virtual worlds in libraries)
Compatibility4	Strongly disagree	25.0%		25.0%	6.7%		8.6%
	Disagree	8.3%	50.0%	25.0%	6.7%		8.6%
	Neutral	25.0%			13.3%	13.0%	13.8%
	Agree	25.0%	25.0%	25.0%	66.7%	43.5%	43.1%
	Strongly agree	16.7%	25.0%	25.0%	6.7%	43.5%	25.9%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

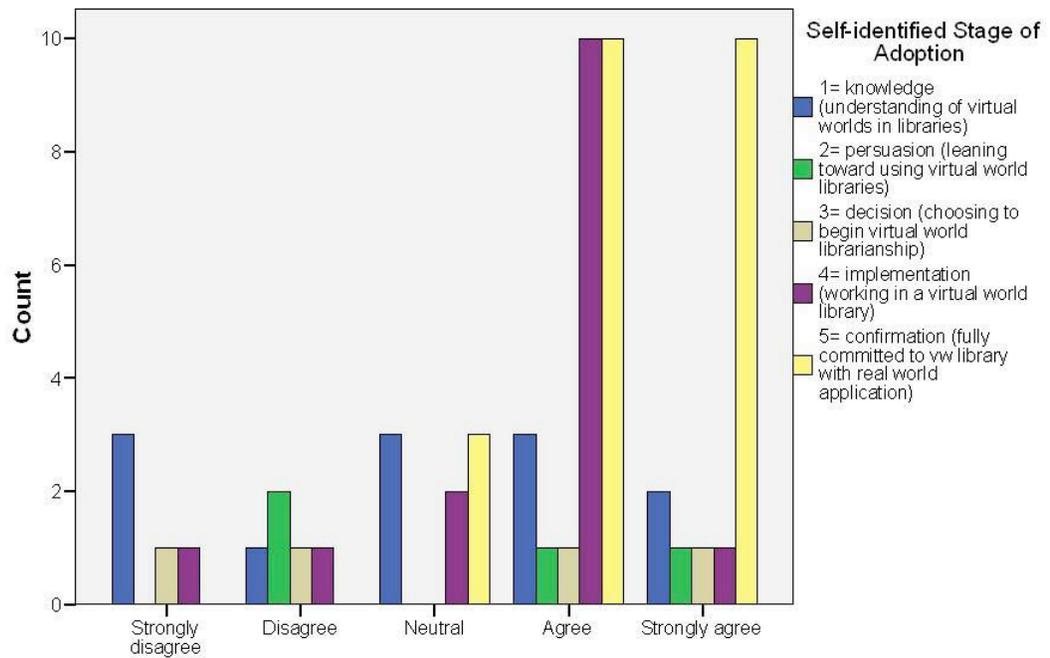


Figure 4.3.4. Compatibility question 4

Most of the surveyed librarians (69%) served as mentors to a colleague.

Examples of help provided to newcomers was evident in many of the participants

comments, although one stated, "I help where I can but I do not call it mentorship."

Another wrote, "I have served as a mentor mainly to other faculty and graduate students."

Examples of mentorship included serving as a docent on ISTE (International Society for Technology in Education) Island and helping library school students. One respondent provided the following example, "A student from San Jose University who was getting her MLIS talked with me almost daily. I felt that our conversations helped her to feel confidence and she just graduated last month."

Compatibility question 5: *Another librarian or colleague provided feedback which helped me understand my strengths and weaknesses.*

Table 4.3.5. Compatibility question 5

Compatibility5 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Compatibility5	Strongly disagree	16.7%	25.0%		13.3%	8.7%	12.1%
	Disagree	8.3%	25.0%		13.3%	8.7%	10.3%
	Neutral	33.3%	25.0%	50.0%	40.0%	21.7%	31.0%
	Agree	33.3%	25.0%	50.0%	20.0%	26.1%	27.6%
	Strongly agree	8.3%			13.3%	34.8%	19.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

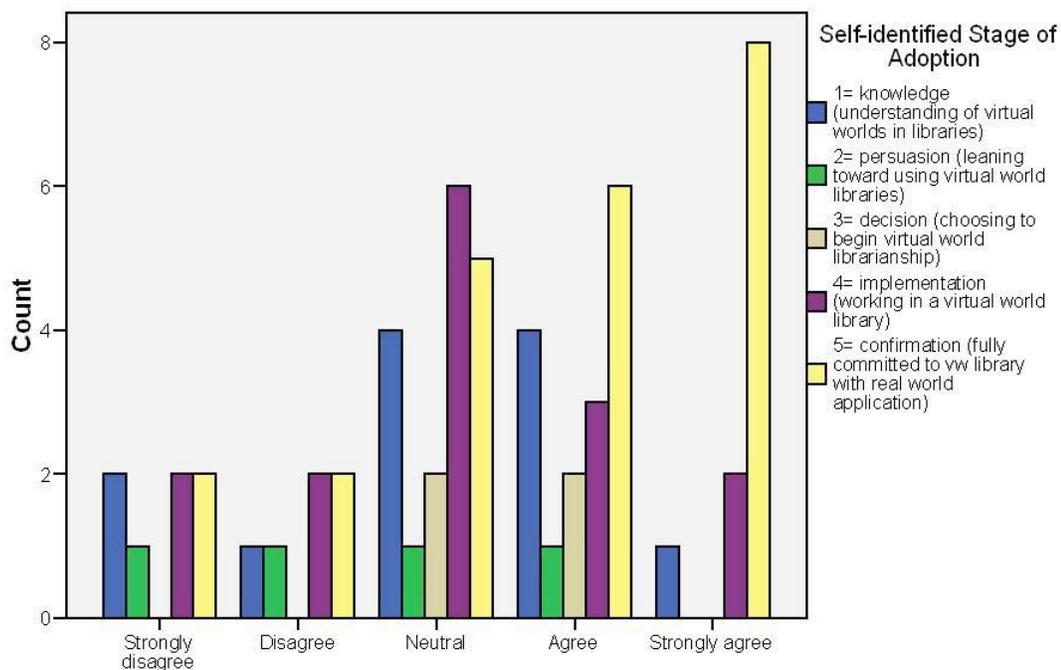


Figure 4.3.5. Compatibility question 5

While 31% gave a neutral response regarding mentorship by another librarian, 47% of those surveyed received helpful feedback from colleagues. Numerous examples of help provided from other librarians were given by participants. For example, a librarian remarked, "Several librarians in the Reference Group were supportive and would include me in projects and volunteer committees. Some would point out where I could improve in making posters, using correct fonts, and linking options that I had not yet learned." Another said, "The conversations I've had with colleagues about our SL libraries have been a big part of my professional growth." An example of providing professional guidance was given by a respondent who stated, "When first leading discussions in SL, a

colleague provided advice on how to better facilitate users in this environment." Another said, "That happened when I was training as a reference librarian by shadowing...I had a very helpful mentor."

Several of the comments expressed confusion about the phrase "strengths and weaknesses". One individual remarked, "Not sure about this - I wouldn't say that anyone had specifically helped me "understand my strengths and weaknesses". On the other hand, I am learning from others continuously."

Compatibility question 6: *Getting to know other librarians inworld (in Second Life) gave me a sense of belonging.*

Table 4.3.6. Compatibility question 6

Compatability6 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementation (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understanding of virtual worlds in libraries)
Compatibility6	Disagree	8.3%			13.3%	8.7%	1.7%
	Neutral	8.3%					8.6%
	Agree	41.7%		50.0%	26.7%	17.4%	25.9%
	Strongly agree	41.7%	100.0%	50.0%	60.0%	73.9%	63.8%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

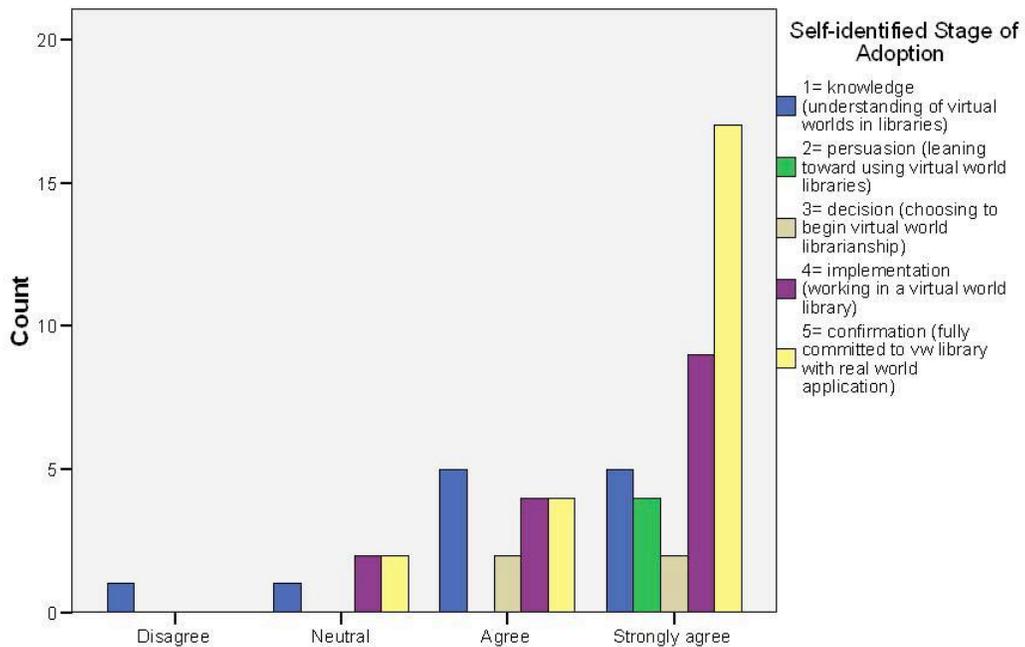


Figure 4.3.6. Compatibility question 6

Belonging to a professional community is evidently an important aspect of virtual world librarianship based on 90% of those surveyed agreeing or strongly agreeing to the statement about a sense of belonging developing through getting to know other librarians inworld. For example, a respondent replied:

One of the most amazing experiences of being a librarian in a virtual world has been belonging to the library community that has grown around it. We have likened it to being at a conference every day - but it is more than that - it is having the ability to meet librarians and library professionals from all levels and types of librarianship, and get to know them on a level that is not possible through brief meetings or email correspondence.

Compatibility question 7: *I felt motivated to explore information related questions inworld.*

Table 4.3.7 Compatibility question 7

Compatpability7* Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Compatpability7	Strongly disagree					6.7%	1.7%
	Disagree					13.3%	3.4%
	Neutral	33.3%	50.0%			13.3%	20.7%
	Agree	50.0%	50.0%	25.0%		26.7%	37.9%
	Strongly agree	16.7%		75.0%		40.0%	36.2%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

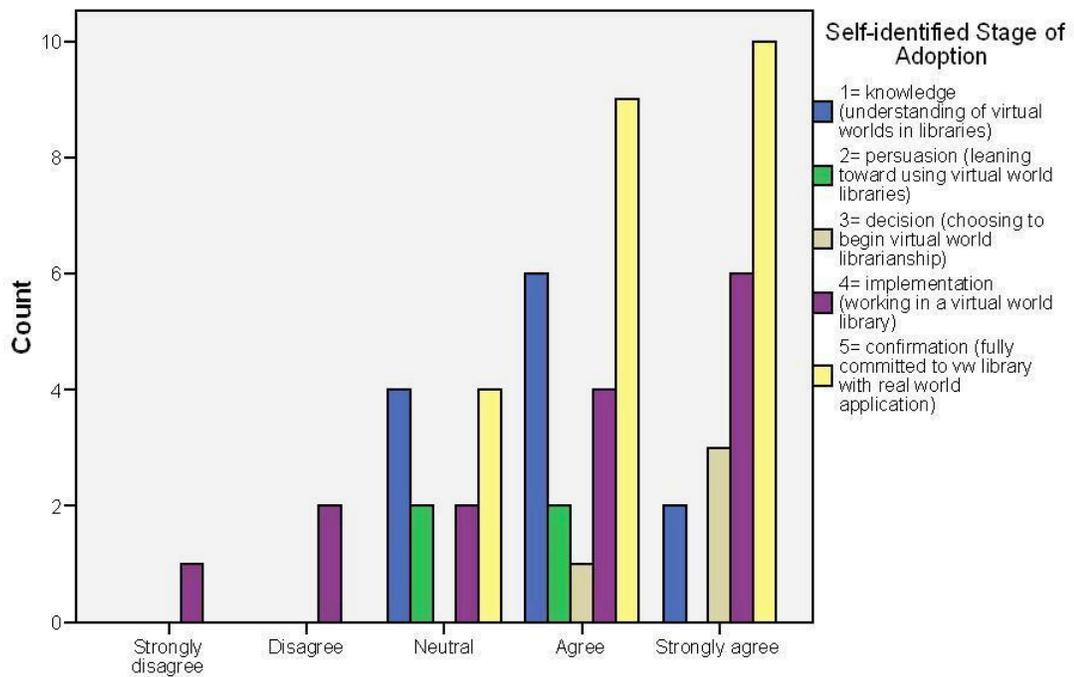


Figure 4.3.7. Compatibility question 7

The majority of participants were motivated to seek and deliver information-related content in the virtual world based on the favorable responses of 74% surveyed.

One simply stated, "That's what we do ... share information related questions." Another elaborated by saying, "I still think there is much to learn. At the very least, the questions that virtual worlds make us ask...broaden the way we look at things. Even if we can never effectively use virtual worlds in some direct way in libraries, virtual worlds are a perfect place to isolate and work on ideas."

A different perspective was given by a participant who remarked, "...information related questions seem to be easier to answer on the Web." When patrons ask for specific information, virtual world librarians often provide links to the Internet; however, examples of informative content in educational simulations were also given. A respondent suggested, "Not all sims are information rich. Many are pretty or representations of real world structures. The ones I loved were those that had rich saturation of information resources, not just pretty buildings, but good depth of content."

Once again, the balance between time spent on professional and personal activities was mentioned, as one respondent remarked, "As noted above, that *was* why I was there. As time went on my tenure in SL got more social than work-related however."

Data analysis summary of compatibility. Rogers' compatibility attribute was found to be a contributing factor in the adoption of virtual worlds in this study. Compatibility question 3, which asked whether or not virtual librarianship is "in harmony with work in a physical library", received 81% favorable responses and only 3% disagreed. However, due to the questionable balance between personal and professional time spent inworld, this attribute must be examined and defined more clearly in the future. Physical world

work space may create and clarify boundaries between roles that are not present in virtual worlds.

Complexity

According to Rogers’ Diffusion Theory, the *complexity* attribute indicates the participants’ level of difficulty for understanding or using the innovation. The next seven questions indicate the participants’ perceptions of the complexity of the innovation of virtual worlds.

Complexity question 1: *I needed a mentor to explain concepts and master skills in a virtual world.*

Table 4.4.1. Complexity question 1

Complexity1 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understand ing of virtual worlds in libraries)
Complexity1	Strongly disagree	16.7%					3.4%
	Disagree	16.7%	50.0%		13.3%	4.3%	12.1%
	Neutral	8.3%			6.7%	17.4%	10.3%
	Agree	41.7%	50.0%	50.0%	73.3%	47.8%	53.4%
	Strongly agree	16.7%		50.0%	6.7%	30.4%	20.7%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

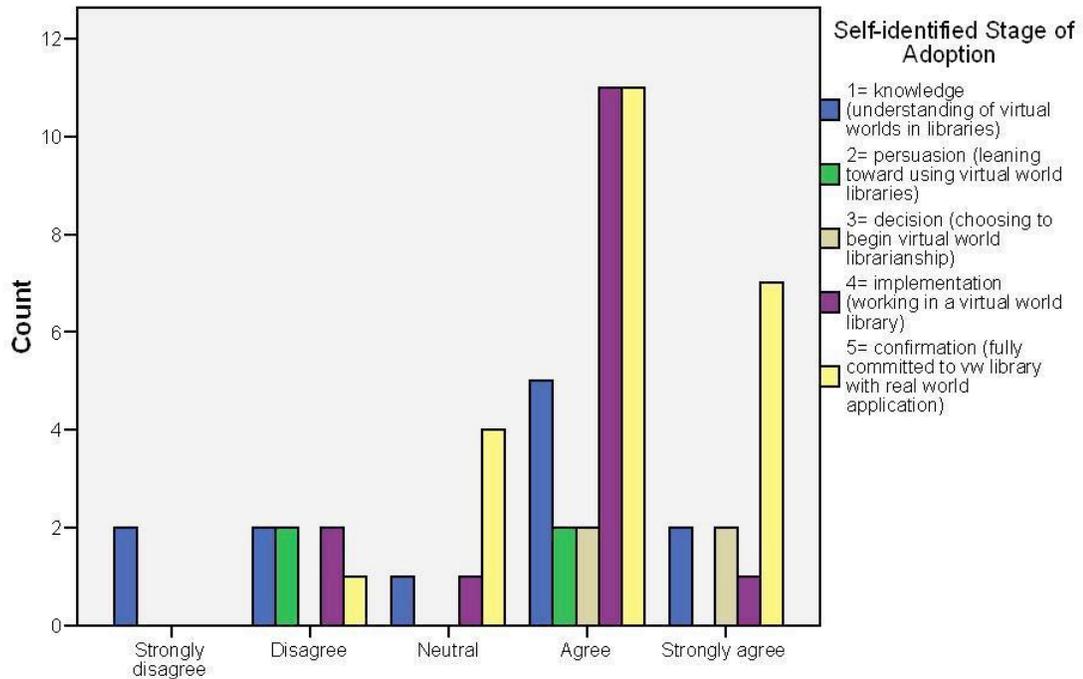


Figure 4.4.1. Complexity question 1

Data shows that that 74% of the survey participants expressed the need for mentorship because of the difficulty level of learning to maneuver in Second Life (table 4.4.1.). This could contribute to the rate of adoption because this initial complexity could cause some individuals to discontinue use early on. For example, one individual said, “Many of my friends acted as mentors when I first began and some people help me still, although I now feel more comfortable with basic tasks.”

Complexity question 2: I was able to converse inworld through text chat easily.

Table 4.4.2. Complexity question 2

Complexity2 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementation (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understand ing of virtual worlds in libraries)
Complexity2	Strongly disagree			25.0%			1.7%
	Neutral			25.0%		4.3%	3.4%
	Agree	33.3%	25.0%	25.0%	40.0%	21.7%	29.3%
	Strongly agree	66.7%	75.0%	25.0%	60.0%	73.9%	65.5%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

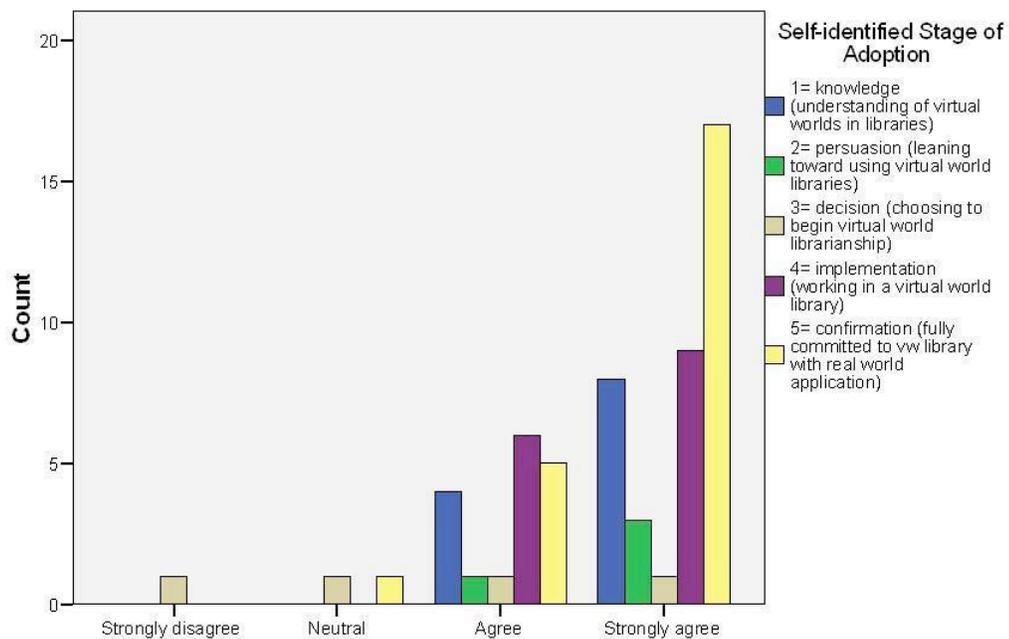


Figure 4.4.2. Complexity question 2

The use of text chat was reported to be easy to use by 96% of those surveyed. All but one of the participants found it easy to communicate through text chat (see fig. 4.4.2.). The participant chose not to explain or provide an example. Another participant

remained neutral. The use of text chat is similar to instant messaging on a computer or chat room and presumably most librarians have already experienced IM or a chat room before entering a computer application that requires higher level skills. One respondent said, "I particularly valued text chat for meetings as it created a transcript naturally."

Complexity question 3: *I was able to converse inworld through voice easily.*

Table 4.4.3. Complexity question 3

Complexity3* Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understand ing of virtual worlds in libraries)
Complexity3	Strongly disagree	16.7%			6.7%	4.3%	6.9%
	Disagree	8.3%			13.3%	13.0%	10.3%
	Neutral	25.0%	25.0%		13.3%	21.7%	19.0%
	Agree	25.0%	50.0%	50.0%	53.3%	43.5%	43.1%
	Strongly agree	25.0%	25.0%	50.0%	13.3%	17.4%	20.7%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

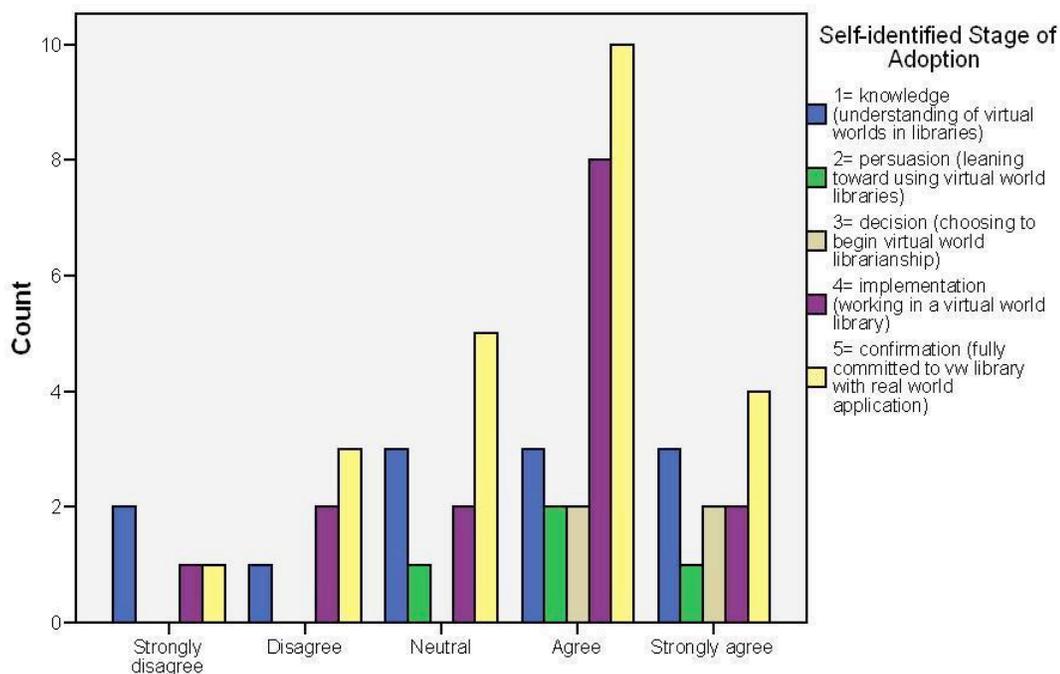


Figure 4.4.3. Complexity question 3

The use of voice was found to be somewhat more complicated than text chat (see fig. 4.4.3.). The number of respondents who found voice easy to use was 64%. Technical problems were encountered, such as this participant’s example, “Voice has too many drawbacks to enumerate..... No permanent record, no ability to translate for non-English speakers, technical issues (background noise, poor equipment, uneven volume....), difficulty discriminating speakers in a crowd.”

Complexity Question 4: *I was able to find and interact with other librarians in SL without a high learning curve.*

Table 4.4.4. Complexity question 4

Complexity4 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementation (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understand ing of virtual worlds in libraries)
Complexity4	Strongly disagree			25.0%		4.3%	3.4%
	Disagree	16.7%	25.0%		13.3%	17.4%	15.5%
	Neutral	8.3%			20.0%	8.7%	10.3%
	Agree	50.0%		50.0%	40.0%	34.8%	37.9%
	Strongly agree	25.0%	75.0%	25.0%	26.7%	34.8%	32.8%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

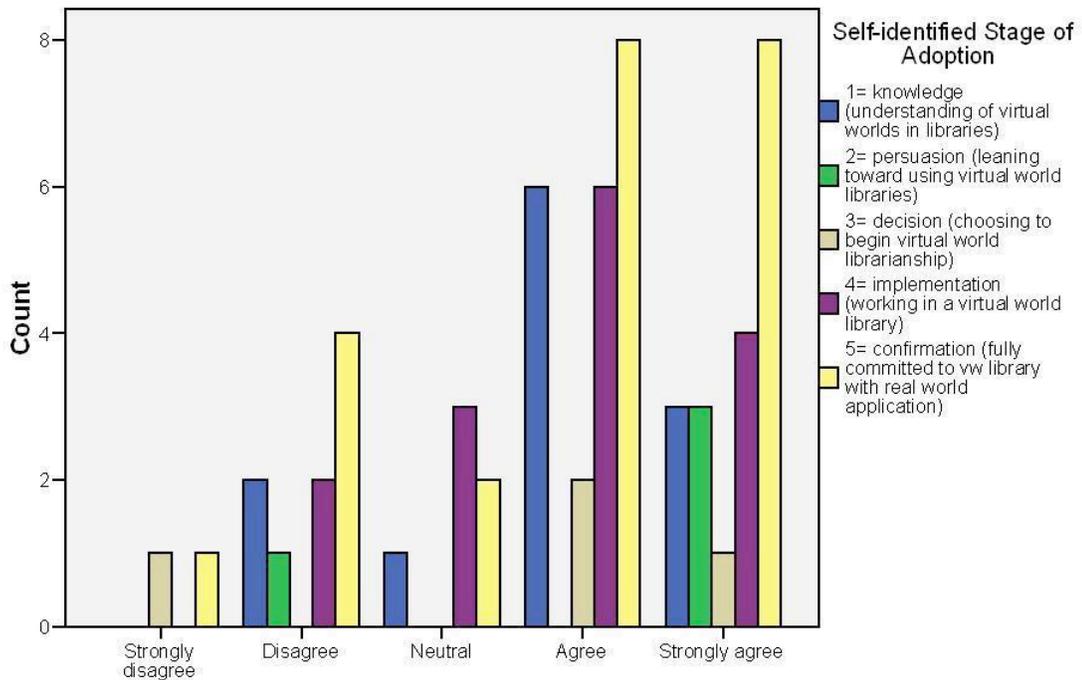


Figure 4.4.4. Complexity question 4

Although 70% of the participants were able to find other librarians inworld, many of the survey respondents found the learning curve difficult (see fig. 4.4.4.). Numerous comments provided examples of difficulties encountered; however, most added explanations and examples of receiving help from other librarians. One librarian illustrated complexity saying, "I had a high learning curve. Not a gamer, no real experience with any other immersive 3D environment, so it took me forever to learn to get around and do even the most basic actions. This is partly because I was the first person in the library to get involved. No one else to help! It was slow going for me, but worth the trouble."

Another participant shared this example, "I found librarians on the first day and within the first month, using the wiki of libraries, surveyed all of them on the list. I also joined the library groups and went to meetings, and that introduced me to the librarians whom I friended."

Complexity question 5: *Combining different types of new information helped me solve complex problems.*

Table 4.4.5. Complexity question 5

Complexity5 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Complexity5	Disagree			25.0%		4.3%	3.4%
	Neutral	50.0%	100.0%		33.3%	21.7%	34.5%
	Agree	8.3%		50.0%	40.0%	34.8%	29.3%
	Strongly agree	41.7%		25.0%	26.7%	39.1%	32.8%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

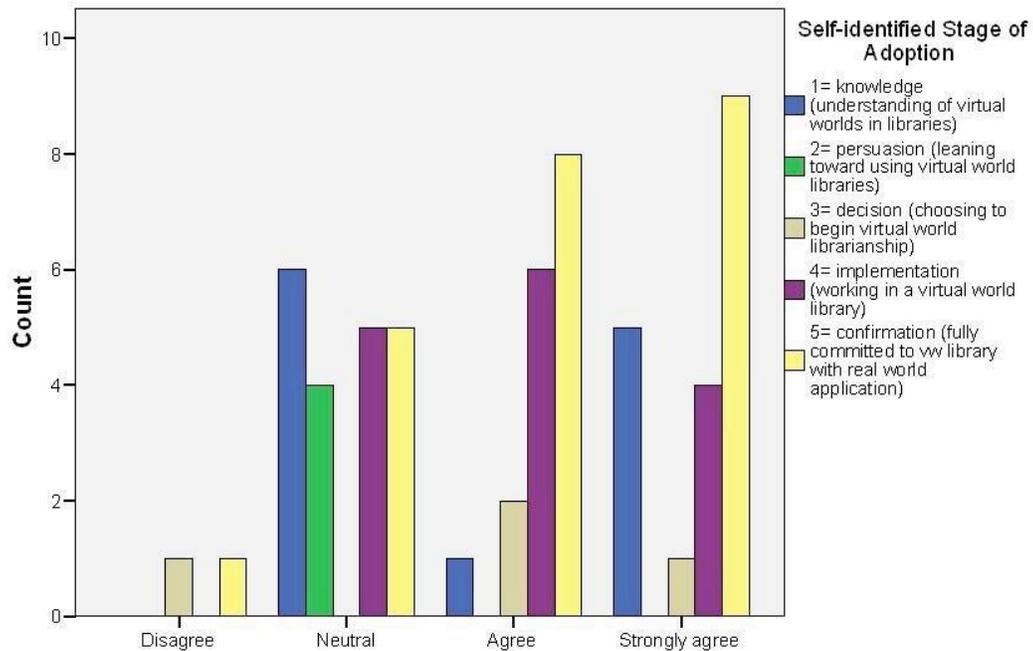


Figure 4.4.5. Complexity question 5

Only 3% of the participants did not find learning through a combination of formats to be beneficial to their understanding. One wrote, "I found that my way of

thinking about learning, about how students learn from play, gaming, and creating has added to my understanding of learning in virtual worlds. I think faculty are slow to adopt some of this. I am always on the selling end of this. Trying to sell faculty on the value."

Although 62% of the individuals were in agreement that complex problems could be solved through combining information, 35% remained neutral. Several respondents expressed difficulty interpreting this question and were confused about the term "complex problems". Perhaps the question should have been written to specifically address the complexity of the virtual world platform rather than problems solved by individuals. It became evident, through reading the participants' examples, that the virtual world can be a complex environment; however, complex problems are encountered in both the physical and virtual worlds. One participant made this clear by stating, "This is always true in RL or SL."

Some of the complex problems librarians currently face pertain to many areas of rapidly changing technology (not only in virtual worlds), which makes the complexity attribute difficult to address specifically. An example of the following participant's response, "I'm working on this one....Second Life has peaked my interest in technology, so I am learning more about the Semantic Web with the idea that some day I will be applying it in a virtual world."

Complexity question 6: *Challenging activities in the virtual world helped me construct explanations/solutions for a variety of information needs.*

Table 4.4.6. Complexity question 6

Complexity6 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Complexity6	Disagree	8.3%	25.0%		6.7%		5.2%
	Neutral	41.7%	50.0%	25.0%	33.3%	26.1%	32.8%
	Agree	25.0%	25.0%	50.0%	46.7%	34.8%	36.2%
	Strongly agree	25.0%		25.0%	13.3%	39.1%	25.9%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

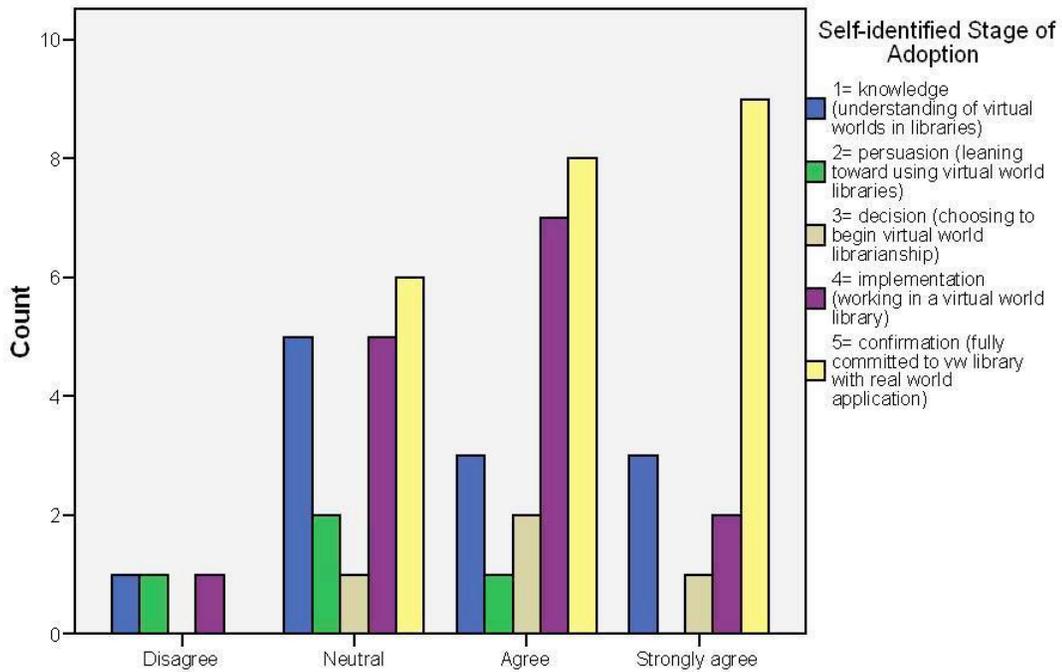


Figure 4.4.6. Complexity question 6

Many of the librarians (62%) were able to solve complex problems (see fig. 4.4.6.); however one wrote, "I haven't had any complex problems to solve yet--though I did run inworld when I was stuck on a question I'd received through our text messaging reference service!"

Some challenging activities helped participants solve problems. On dealing with complexity in the virtual world, one librarian wrote, "I learned here that the dance between learning and experimentation is vital to a full understanding of any creative endeavor - be it music, building, architecture or just helping a disparate group of people get along."

Complexity question 7: *I easily developed solutions in SL to information-seeking problems that can be applied in practice.*

Table 4.4.7. Complexity question 7

Complexity1 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understand ing of virtual worlds in libraries)
Complexity1	Strongly disagree	16.7%					3.4%
	Disagree	16.7%	50.0%		13.3%	4.3%	12.1%
	Neutral	8.3%			6.7%	17.4%	10.3%
	Agree	41.7%	50.0%	50.0%	73.3%	47.8%	53.4%
	Strongly agree	16.7%		50.0%	6.7%	30.4%	20.7%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

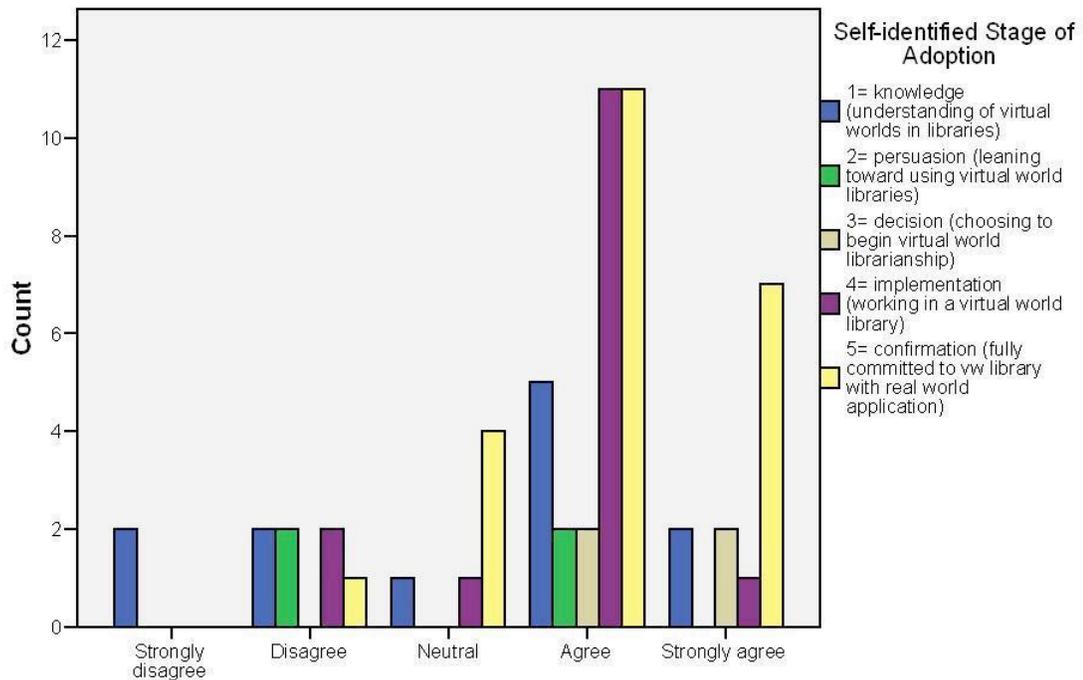


Figure 4.4.7. Complexity question 7

With 74% of the respondents agreeing that solutions to information-seeking problems were easily developed, the comments given provide a paradox. One person said, "It took a while... making connections and learning how to create and operate in SL first." Another participant wrote, "My biggest challenge in information-seeking was trying to convince administrators that this is a viable scholarly platform." Challenges with administration may not actually fit under the *complexity* attribute.

Data analysis summary of complexity. Examples of the difficult learning curve were given by participants in both the complexity questions and the trialability questions. The complexity attribute was found to be problematic, as explained in complexity question 5, because participants made references to complex problems outside of the virtual world. Based on the expressed qualitative data in the participants' responses,

Second Life as an innovation is described as complex; however, the questions on complexity were not always in relation to the innovation. This limitation will be discussed in the next chapter more fully along with an explanation of the reasons for the survey design and how future studies might better address the issues of trialability and complexity through both quantitative and qualitative methods.

Observability

The observability attribute, according to Rogers’ Diffusion Theory, indicates the degree to which the results of an innovation are visible. The next seven questions indicate the participants’ perceptions of the observability of the innovation of virtual worlds.

Observability question 1: *I have observed librarians engaging users in a virtual world environment in meaningful ways.*

Table 4.5.1. Observability question 1

Observability1 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Observability1	Strongly disagree			25.0%			1.7%
	Neutral	16.7%			6.7%		5.2%
	Agree	50.0%	50.0%	50.0%	46.7%	30.4%	41.4%
	Strongly agree	33.3%	50.0%	25.0%	46.7%	69.6%	51.7%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

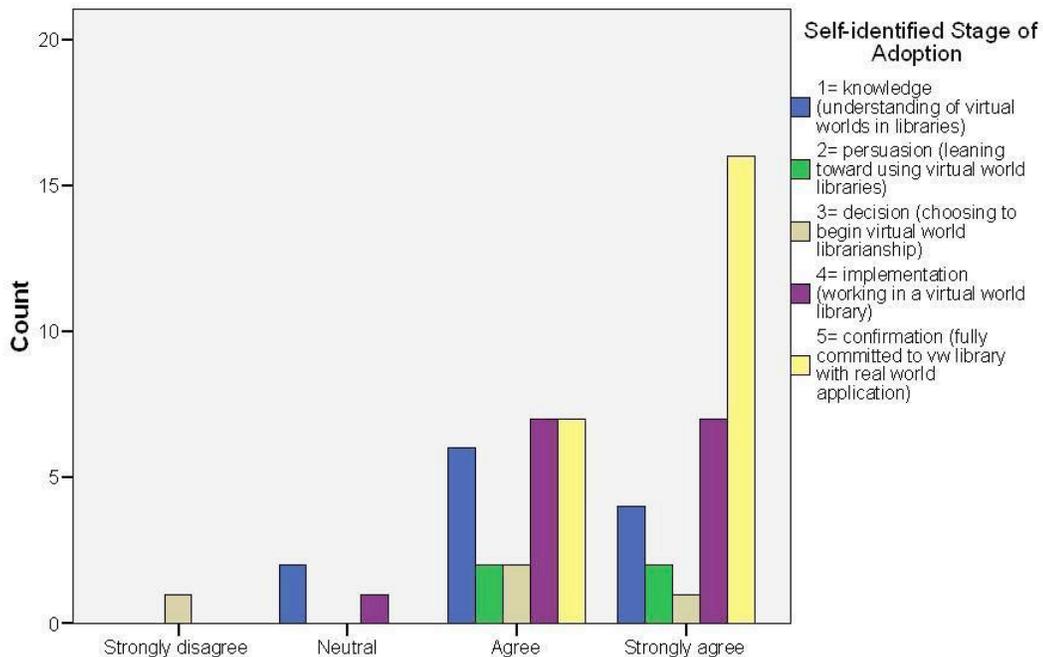


Figure 4.5.1. Observability question 1

Of the individuals surveyed, 93% have observed librarians working in virtual worlds (see fig. 4.5.1. and examples given). One interesting illustration about the difference between the physical and virtual world interaction among library patrons was given by the following participant's example:

In general, I don't think what happens there is significantly different (in essence) from what occurs in the real world.. BUT...I do believe that from the standpoint of the individuals, what occurring between may be different that what might have happened in real life. An example.... One night, while working in Virtual Harlem, 3 of Bryan Carter's students stopped by to talk with me. I did not do formal research instruction with his students, because he had his own librarians from his home institution working with them in-world and at their physical reference desk. But we sat, and talked (me looking like a normal person, the students guised as a teddy bear, a dragon, and an giant ant.) The research conversation we had together, I believe, was tighter, and more intense because it was remote and embodied, not in person.

Comments included examples of librarians helping SL patrons at the reference desk, helping others find resources on particular topics (such as medicine and health), and sharing landmarks for events and simulation areas. One librarian gave another example:

Students, faculty or patrons looking for content in a virtual world are no different than those looking for content in the physical world. Librarians are experts at locating content in various formats. In the virtual world there are additional formats of information and those who have been trained to evaluate and choose the best places to recommend to VW users are valued by all. I have observed and served myself as an expert guide for those seeking information in virtual worlds. Whether it's providing users with a landmark to the Ohio State University's Testis Tour for reproductive information or to Genome Island for information on cells, the human genome project or more, librarians can and have definitely assisted in meaningful ways.

Observability Question 2: *I witnessed or produced documentation of librarians collaborating in the virtual world. (Examples: literature articles, machinima, etc.)*

Table 4.5.2. Observability question 2

Observability2 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Observability2	Strongly disagree			25.0%			1.7%
	Disagree				6.7%		1.7%
	Neutral	33.3%		25.0%	13.3%	4.3%	13.8%
	Agree	58.3%	75.0%	25.0%	26.7%	26.1%	36.2%
	Strongly agree	8.3%	25.0%	25.0%	53.3%	69.6%	46.6%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

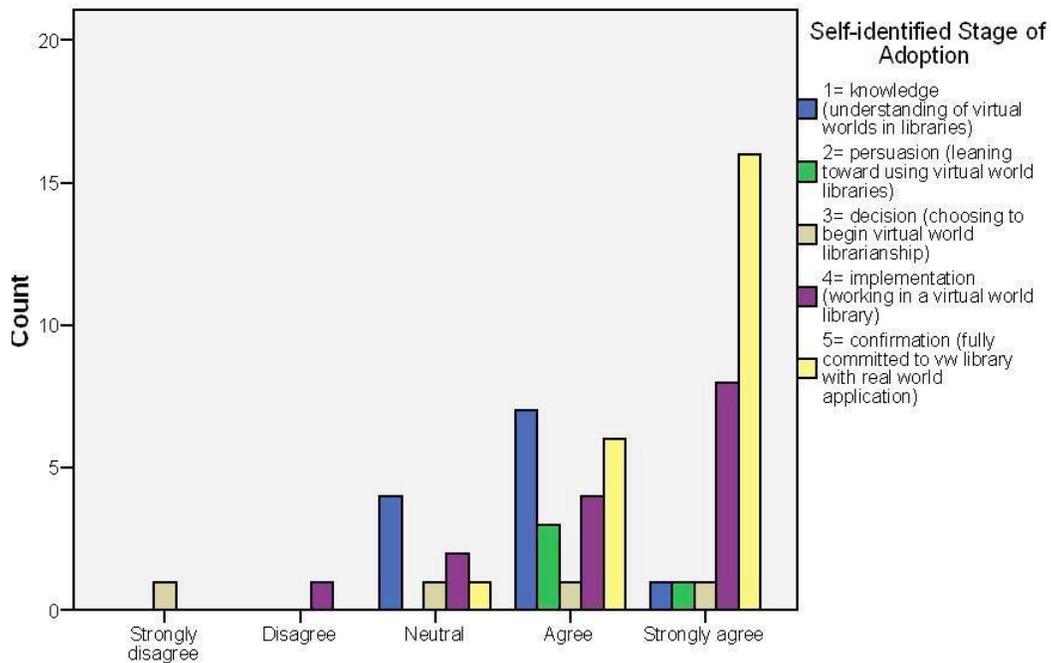


Figure 4.5.2. Observability question 2

83% of the survey participants witnessed or documented work of virtual world librarians (see table 4.5.2.). Examples given included attending virtual world conferences, presenting inworld to colleagues, contributing to professional papers, posters, journals or books, and creating or viewing machinima of educational or information events and resources. Very few of the librarians were unaware of the professional work of librarians in the virtual world of Second Life (see fig. 4.5.2.).

Observability question 3: *I have observed other virtual world librarians contribute to the field.*

Table 4.5.3. Observability question 3

Observability3 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementati on (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Observability3	Strongly disagree	8.3%		25.0%			3.4%
	Neutral	16.7%	25.0%		13.3%	4.3%	10.3%
	Agree	50.0%	50.0%	25.0%	40.0%	26.1%	36.2%
	Strongly agree	25.0%	25.0%	50.0%	46.7%	69.6%	50.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

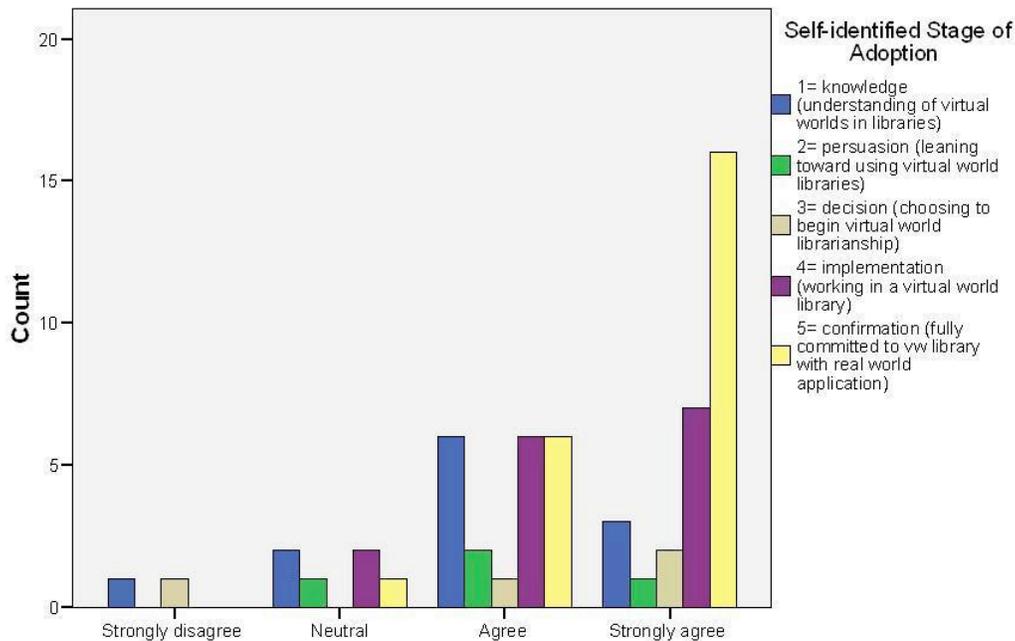


Figure 4.5.3 Observability question 3

Most of the librarians (86%) have observed colleagues' contributions and they provided many examples, such as, "We've got a nice body of articles, books, etc that record the ideas that librarians have about working in virtual worlds, so there's a

contribution to librarianship - and plenty of contributions to the development of Second Life by people like Jeremy Kemp - (I hate to start naming names - I'll leave people out!)"

Another stated, "There are too many to list! I know of many publications, national and international presentations, videos, etc. to list here. It would be a 20 page bibliography."

Some of the participants not only listed observation through traditional publishing formats, but added comments regarding observations inworld, such as, "There are so many librarians & professors I have met here who are interested in learning, and also following post-graduate and beyond training. Or they are teaching in SL. They are intellectually curious, and are creating resources that are useful for other students, for MLIS students, and for regular SL'ers. It is also a great place to do research, and there are some very interesting articles that have come out of research done here."

Observability question 4: *I was able to form distinct impressions of some SL librarians.*

Table 4.5.4. Observability question 4

Observability4 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementation (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understanding of virtual worlds in libraries)
Observability4	Strongly disagree			25.0%			1.7%
	Disagree					4.3%	1.7%
	Neutral	25.0%			13.3%		8.6%
	Agree	33.3%		25.0%	26.7%	26.1%	25.9%
	Strongly agree	41.7%	100.0%	50.0%	60.0%	69.6%	62.1%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

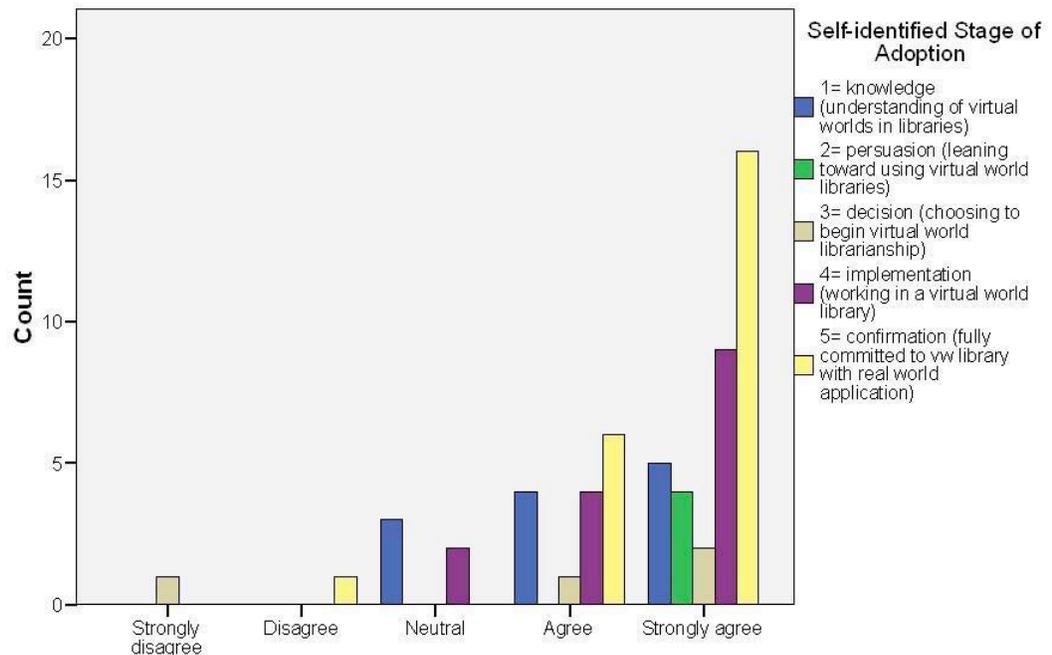


Figure 4.5.4. Observability question 4

Distinct impressions of other librarians were formed by 88% of the respondents. Survey participants gave examples of meeting librarians first in Second Life and later in a physical world setting, remarking on the similarity with statements such as "... when we met, face to face, I saw her, knew immediately who she was, walked up and greeted her." Another wrote, "It is amazing how much you get to know someone online even better in some ways than in rl. People feel less self conscious about revealing themselves and are more apt to share ideas and goals.

One participant disagreed and illustrated the contributing factor of anonymity one has in a virtual world, saying, "Not really, the degree of anonymity created some disconnect. Some librarians I figured out their RL identity and that helped me place them. Others remained anonymous and sometimes used the anonymity to behave oddly. By

oddy I mean more aggressive or evasive than they might otherwise."

Observability question 5: *I observed a variety of perspectives and points of view inworld.*

Table 4.5.5. Observability question 5

Observability5 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Observability5	Disagree					4.3%	1.7%
	Neutral				6.7%	13.0%	6.9%
	Agree	58.3%	25.0%	25.0%	26.7%	26.1%	32.8%
	Strongly agree	41.7%	75.0%	75.0%	66.7%	56.5%	58.6%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

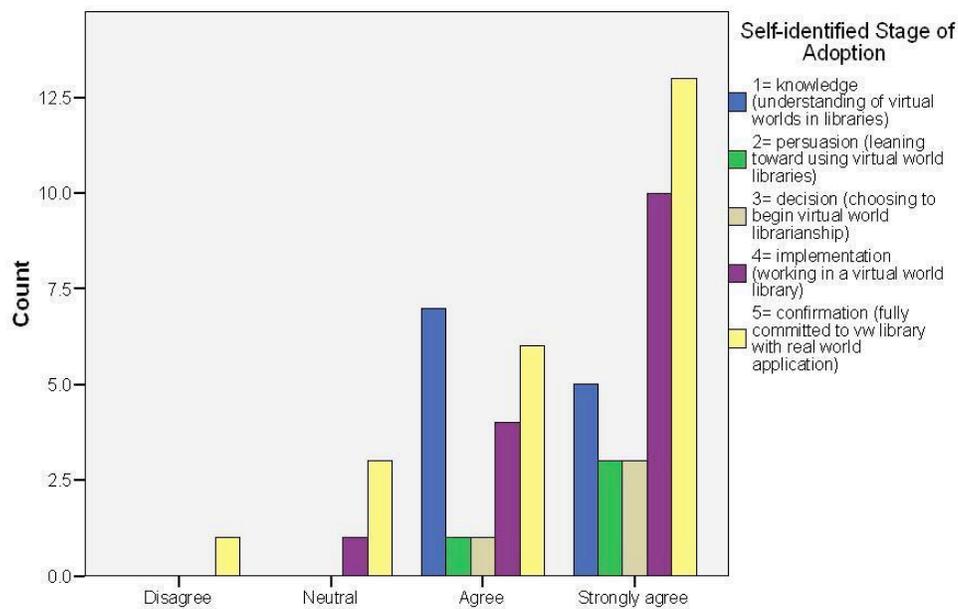


Figure 4.5.5. Observability question 5

A variety of perspectives were observed by all but one respondent (see fig. 4.5.5.). The only one outlier disagreed stating, "I'm going to say not on this. Everyone in-world is positive about technology, so there is a major point of view that is missing--the anti-technology or a-technological viewpoint." Clearly, this participant believed the question was worded to discard those who do not embrace technology, which may not be relevant in this case because all those surveyed had at least two years experience in a virtual world. The "anti-technology perspective" would be very unlikely to encounter. Of course, newcomers to the innovation might have a more negative attitude toward technology. Clearly, the data shows that observation of various individual perspectives is evident in Second Life (see table 4.5.5.).

Observability question 6: *I view my avatar as an extension of myself as a person AND as a professional.*

Table 4.5.6. Observability question 6

Observability6 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total 1= knowledge (understanding of virtual worlds in libraries)
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementatio n (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	
Observability6	Disagree	8.3%				4.3%	3.4%
	Neutral	25.0%					5.2%
	Agree	58.3%	75.0%		20.0%	4.3%	24.1%
	Strongly agree	8.3%	25.0%	100.0%	80.0%	91.3%	67.2%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

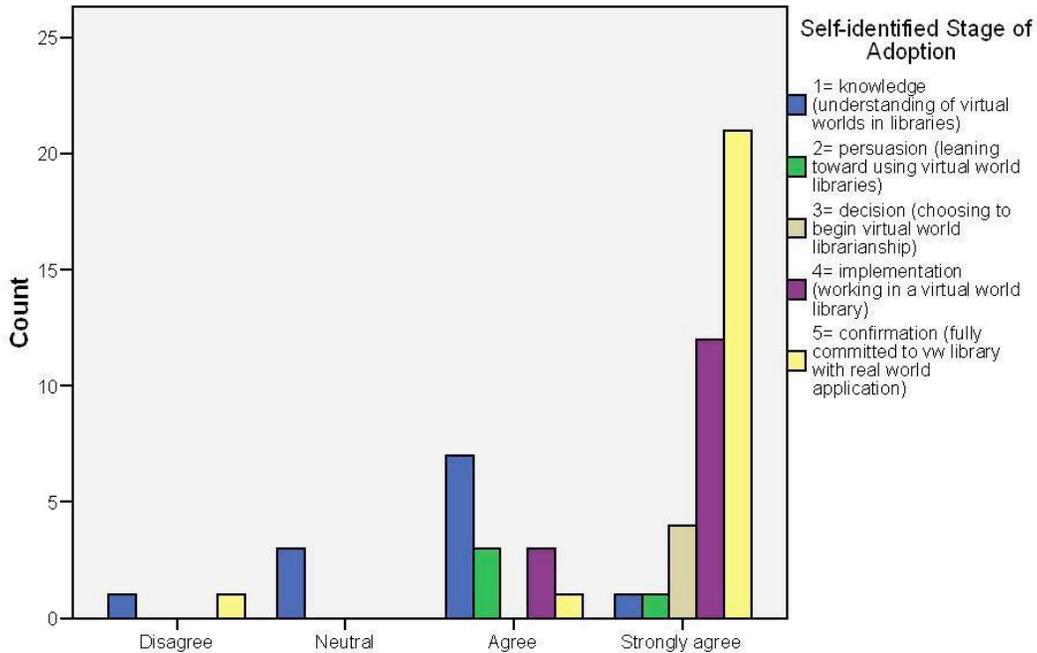


Figure 4.5.6 .Observability question 6

Based on 91% of the surveyed respondents, most librarians view a virtual world avatar as an extension of themselves. One participant, a library volunteer self-identified in stage one *knowledge*, did not view an avatar as an extension of self. The volunteer explained, "For the most part, I keep my primary avatar separate from my profession. I have an avatar specifically for professional interactions". One librarian, self-identified as fully committed to adoption of virtual worlds disagreed with the statement by clarifying, "I don't think it is an "extension", it is ME, part of me as a person AND as a professional, not something extra or separate."

Perception and observation of one's avatar as an extension of self, particularly in a professional setting is clearly evident in the survey analysis (see table 4.5.6.).

Observability question 7: *Because of what I have witnessed, I predict virtual worlds will continue to grow in the future.*

Table 4.5.7. Observability question 7

Observability7 * Self-identified Stage of Adoption Crosstabulation

% within Self-identified Stage of Adoption

		Self-identified Stage of Adoption					Total
		1= knowledge (understanding of virtual worlds in libraries)	2= persuasion (leaning toward using virtual world libraries)	3= decision (choosing to begin virtual world librarianship)	4= implementation (working in a virtual world library)	5= confirmation (fully committed to vw library with real world application)	1= knowledge (understan ding of virtual worlds in libraries)
Observability7	Disagree	8.3%					1.7%
	Neutral	8.3%		25.0%	20.0%	4.3%	10.3%
	Agree	41.7%	75.0%	75.0%	53.3%	26.1%	43.1%
	Strongly agree	41.7%	25.0%		26.7%	69.6%	44.8%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

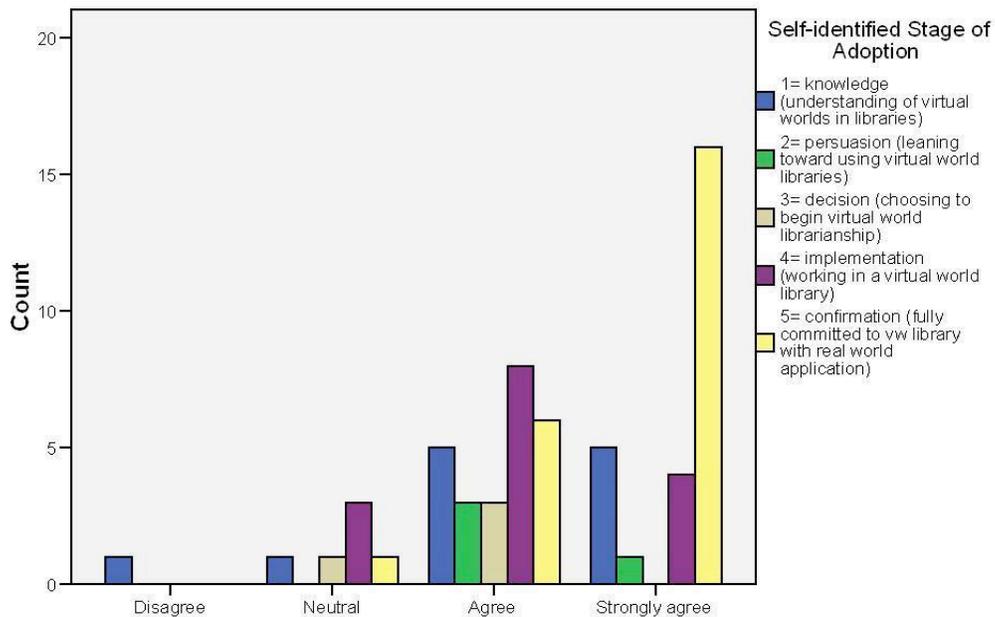


Figure 4.5.7. Observability question 7

Only one participant, the same library volunteer self-identified in stage one *knowledge* (see fig. 4.5.6. and fig. 4.5.7.), did not predict growth of virtual worlds in the future. The data shows that prediction of the growth of virtual worlds by librarians is strong with 89% predicting future growth.

Data analysis summary of observability. Data for the observability attribute shows that the majority of survey participants have observed the contributions of librarians in Second Life to the library profession through traditional publication and various other professional proceedings. In addition, the majority of participants have witnessed and observed professional contributions inworld and predict growth of virtual worlds by librarians in the future.

Summary of Findings

Both quantitative and qualitative methods of analysis were used to analyze the survey data through analysis of the Likert scale (charts, tables, and percentages) and through key words and phrases examined in the comments from the survey participants. Overall results of the survey data indicate particularly strong evidence of three of Rogers' attributes: relative advantage, compatibility, and observability.

Table 5.1. Descriptive statistics for contributing factors

Attribute Question	Minimum	Maximum	Mean
Relative Advantage 1	2	5	4.22
Relative Advantage 2	1	5	4.17
Relative Advantage 3	1	5	4.59
Relative Advantage 4	3	5	4.64
Relative Advantage 5	3	5	4.54
Relative Advantage 6	3	5	4.73
Relative Advantage 7	3	5	4.39
Compatibility 1	1	5	3.88
Compatibility 2	1	5	2.76
Compatibility 3	1	5	4.19
Compatibility 4	1	5	3.67
Compatibility 5	1	5	3.34
Compatibility 6	2	5	4.55
Observability 1	1	5	4.41
Observability 2	1	5	4.20
Observability 3	1	5	4.29
Observability 4	1	5	4.47
Observability 5	2	5	4.50
Observability 6	2	5	4.55
Observability 7	2	5	4.30

Table 5.2. Descriptive statistics for non-contributing factors

Attribute Question	Minimum	Maximum	Mean
Trialability 1	1	5	2.97
Trialability 2	1	5	3.41
Trialability 3	1	5	4.22
Trialability 4	2	5	4.00
Trialability 5	4	5	4.70
Trialability 6	2	5	4.49
Trialability 7	1	5	3.68
Complexity 1	1	5	3.78
Complexity 2	1	5	4.57
Complexity 3	1	5	3.57
Complexity 4	1	5	3.79
Complexity 5	2	5	3.93
Complexity 6	2	5	3.86
Complexity 7	2	5	3.54

Descriptive statistics for the factors found to be contributing to the adoption of virtual worlds by librarians show the highest scoring question to be Relative Advantage Question 6. The questions asked participants to rate agreement to the statement: *I believe virtual worlds provide advantages beyond an online class for education and information seeking individuals*. Based on question (Relative Advantage Question 1), regarding the belief of virtual work benefiting the profession, 81% of those surveyed find the attribute of relative advantage highly relevant to librarianship in a virtual world.

The lowest scoring question in the survey (see table 5.1.) was Compatibility Question 2 which stated: *I spend more time in SL for professional reasons than for other reasons*. As explained earlier, this surprising finding does not decrease the compatibility factor because the examples given illustrated the trend toward a “blurring” of professional and person time spent on technological applications in general. In addition, 81% find the innovation compatible to the profession of librarianship based (Compatibility Question 3). A question on the observation (documentation of work) of virtual world librarianship (Observability Question 1), shows 93% of those surveyed have observed library work taking place in the virtual world. This answers the first research study question (RQ1.) What are the most influential of Rogers' five attributes of Diffusion Theory for librarians making the decision to adopt virtual worlds as a professional medium?

Two of Rogers' attributes, trialability and complexity, were not found to lead librarians toward the decision to adopt based on the qualitative data derived from key words and phrases given in the participants' responses along with the quantitative data (see table 5.2). Based on a trialability question (Trailability Question 1) 44% of the respondents found the innovation difficult to "try out", 43% found it easy, and 14% remained neutral. This question received the highest number of comments (66) with the majority of them citing (56) examples of difficulty learning to maneuver, difficult system requirements, and a difficult interface to learn. One question (Complexity Question 1) asking if a mentor was needed to explain concepts and master skills showed 74% of the respondents agreeing or strongly agreeing to that need due to complexity.

Librarians who self-identified themselves in the first stage of adoption (knowledge of the innovation) scored slightly lower on the three strong attributes. For example, only 50% of those in the knowledge stage of adoption agree that virtual worlds provide benefits to the profession (see table 4.2.1). In addition, a smaller percentage (67% rather than 81% which was the percentage of all respondents) believes work as a virtual world librarian is in harmony with work in a physical library (see table 4.3.3.). Under the compatibility attribute, individuals who self-identified themselves in any of the first three stages of adoption (knowledge, persuasion, or decision) rated lower on observance of contributions by librarians to the field than those who are in the self-identified stages of implementation or confirmation. For the first three stages of adoption, based on Observability Question 3, 75% have made those observations. For the implementation stage of adoption, 87% have made those observations. For the final stage of adoption (confirmation), 96% have observed the work of librarians in the virtual world as a professional contribution. Of course, those who admit to knowledge of the innovation only (no implementation of the innovation) understandably would not have as many personal connections to the attributes, such as personal observations, experiences, and examples. Still, the scores for those attributes were high at 75%, 87%, and 96% (see table 4.5.3) This answers the second research study question (RQ2) How are Rogers' five attributes of Diffusion Theory relevant to the adoption of virtual worlds when applied to the self-identified stage of adoption of librarians?

Numerous examples, anecdotes, and illustrations of the relative advantage of virtual world librarianship and compatibility to the profession were given by study participants. Academic publications, journal articles, or research projects were mentioned as observation or documentation on the progress of virtual world librarianship. Because of firsthand knowledge and observation, nearly all of the survey participants predict virtual world growth in librarianship.

Because many librarians did not find the virtual world of Second Life easy to "try out" initially, the attribute of trialability was less influential in leading to adoption based on the 56 cited examples of initial difficulties. Many overcame initial obstacles, as well as the "high learning curve" mentioned numerous times, which means the attribute of complexity also was less influential in leading librarians to adopt virtual worlds. Perhaps the fact that Second Life is not "easy to try out" and is perceived as complex explains why the innovation has not achieved a faster rate of adoption among librarians.

In summary, through analysis of both the qualitative and quantitative data, the study shows examples of higher perception of the attributes of relative advantage and compatibility with librarianship, and a good deal of observation of the innovation among librarians choosing to adopt virtual worlds for professional use. Based on qualitative data analysis, the perception of trialability and complexity as attributes leading to adoption was much lower. This means that librarians the majority of librarians did not find the innovation easy to initially "try out" and found it complex to use, although many

overcame those obstacles through personal perseverance or with the help of others as exemplified through anecdotes.

CHAPTER V

DISCUSSION AND IMPLICATIONS

As explained in the introduction, librarians during the early part of the 21st century are faced with a problem of providing relevant resources in a rapidly and radically changing information climate. Unprecedented changes in media formats and information technology are increasing exponentially. Millions of intelligent people share user-generated content on blogs, social networks, wikis and websites, which create a mass of information difficult to fathom as digital life becomes a part of daily life for most people. Understanding best practices of emerging technology trends can best be accomplished through forming a professional learning community of experts on particular trends that impact libraries and librarians. Toward that end, this dissertation study focused on only one facet of technological change in information delivery and librarianship: virtual worlds.

Discussion of the Findings

The findings of this study suggest that virtual worlds are a useful tool for librarians, as they provide benefits and advantages that are compatible to the profession. Among those advantages, resource delivery, professional development, educational content, virtual field trips, collegiality, and a shared sense of presence were indicated

most often. When asked "Is there anything else you would like to share about your own personal experience in a virtual world?" one respondent wrote the following:

These stages do not fit my situation exactly. I am not certain that maintaining a traditional library in VWs is the major advantage for librarians in VWs. Instead, information services are important, especially course support, students user instruction, VW research methods for students, etc., having a library is not necessarily the service needed. Resources linking to the RL library catalog and databases can be useful but not as important as information services that involve librarians in actively working with users. If users prefer to see that as the 'library' it could work, but there are many empty and inactive libraries in SL, beautiful and filled with resources but without services. This is an RL staffing issue and a traffic issue. if no one comes staff cannot work in SL. The reference desk on Info island has staffing issues. Students who come to shadow find no one there, people often miss their shifts so new students get discouraged to find no librarian on duty when the calendar says otherwise. I believe a shift will occur as tweens enter college and there will be many more students in VWs for librarians to work with, so we must remain committed to SL to gain ground.

This example shows that other factors must be in place before many librarians can commit to adoption of the innovation of virtual worlds, even if they rate contributing attributes as highly important, such as relative advantage. While the many examples of compatibility with librarianship illustrate important factors that could lead to adoption, librarians who are volunteering to learn this innovation on their own time (outside of work they perform on the job in a physical library) may become frustrated with the lack of interest or validation from authority figures. Many, however, find the benefits to warrant spending time while continuing to watch for other new trends in information delivery. A survey respondent, in answer to the same question about additional personal experiences, wrote,

I will continue to serve as a librarian for faculty and courses being taught in VWs by my university until they no longer are used for that purpose. They are currently

being used less for this purpose than a couple of years ago so it's difficult to say. I will use VWs for professional development purposes for as long as it makes sense to do so (until something better comes along). As technology changes, I'll choose the tool that best meets my needs and the needs of the constituents I serve. There will always be a cost/benefit question with any new technology I choose.

The rate of adoption of the innovation may not have accelerated at the rate of predictions (Prentice 2007) due to rise of other technologies or due to the complexity of virtual worlds. The study indicates that a majority of individuals do not find the virtual world of Second Life, in particular, easy to try initially. Perhaps the next generation of users, born into the digital age, will have less difficulty mastering the high learning curve; in fact, those so-called "digital natives" may feel comfortable with virtual worlds and find them a natural extension of the physical world (Prensky 2001).

An interesting factor emerging in the findings of this research study was the amount of time spent in the virtual world by librarians for personal rather than professional reasons (see fig. 4.3.2 and pages 84-85). The question about time spent for personal or professional reasons may appear to have clouded the clear understanding of the compatibility attribute. However, as with all online activities, virtual worlds provide a wide-variety of purposes, which include education, entertainment, information gathering, socializing, or content creation, for example. For many people, the line between personal and professional tasks is no longer clear, due to the increase in smart phones and other emerging technologies in both the physical and digital worlds.

Because computer applications (both hardware and software) evolve quickly, the speed of academic publication cannot keep pace with innovations in information science. The gap between publication date and usefulness of important findings could be viewed

as a limitation to research studies on innovation. The body of literature reviewed during the course of this dissertation continues to grow, with new studies presenting evidence of the usefulness of the tools examined. Futurists predict both ever-increasing benefits of virtual reality and caution users about Internet addiction. Blascovich and Bailenson write, "The Internet and virtual realities easily satisfy such social need and drives-- sometimes so satisfying that addicted users will withdraw physically from society (Blascovich and Bailenson 2011).

Psychological effects of virtual worlds are beyond the scope of this research study; however, the personal time spent in virtual worlds was documented as often overlapping the professional. As with all online applications such as email, social media, user-generated content and social networking, the line between professional use and personal use can often be difficult to distinguish. Therefore, careful evaluation of professional ethics, values, and standards should be addressed in future studies on the role of librarians in virtual worlds to assure questions accurately define factors addressed or measured.

Currently, the strong attributes seen in the study's findings, relative advantage, compatibility, and observation are relevant to the state of virtual world libraries to date and may be useful for other librarians interested in exploring virtual worlds as a professional platform. The weak attributes, trialability and complexity, were determined by the data along with shared examples of difficulty entering the virtual world and the high learning curve encountered throughout the process of adoption. The decision to focus the research survey on the attributes of Diffusion Theory with a limited target

audience (librarians with at least two years experience in virtual worlds proved relevant for this purpose but was not without limitations and weaknesses.

For example, the decision to focus research only on the attributes of Diffusion Theory identified by librarians created the problem of determining placement of the attributes of adoption within the hierarchy of social systems, such as libraries and institutions. The survey did not address the social systems of each participant because many of the librarians are learning the innovation as volunteers outside of the library system. The study is focused on the librarian and not the library. However, understanding the attributes of self-identified librarians may be a useful first step in understanding the adoption of virtual worlds as the trend continues or evolves in the future.

Implications

As documented in the findings, the majority of surveyed participants predict virtual worlds to grow in the future as a platform for information delivery and librarianship. Examples of relevant work contributed by librarians in virtual worlds during the years 2006 – 2011 illustrate the benefits and advantages of the innovation; and examples, explanations, and comments validate the compatibility with the profession of librarianship. The survey took place in the summer of 2011 and was open from June 1 through July 31, 2011. The examples of the participants, alongside the literature review of the subject of virtual worlds, documents observation of the trend and strengthen the perception of that attribute.

As technology trends and applications are evolving, students and patrons now bring electronic gadgets with them and spend more time at the computer than at the stacks. New media trends include digital novels (full of multi-media but little linear text) and augmented reality which is predicted to grow in the next two to five years (Horizon 2011). It is important to point out that virtual worlds are only one of the many new formats that are changing libraries. These trends in new media formats illustrate the fact that no single individual can become an expert in all areas of librarianship. With that limitation in mind, the goal of this research study was to explore virtual worlds from the perspective of librarians and library work with the aim of sharing results with the profession. Those results show evidence of what librarians have done, what factors contributed to their adoption, and may help others better understand the phenomenon or make choices about involvement.

Evidence shows that, currently, the virtual world of Second Life is perceived as difficult for individuals to experience during a trial period and is considered complex, even for those with experience in computer technology trends. The attributes of Diffusion Theory that may explain why many librarians have not chosen to adopt virtual worlds are trialability and complexity based on the number of comments and examples providing evidence of the difficult initial learning curve.

Limitations

One limitation to the design of this research study was found in the merging of the attributes of Rogers' Diffusion Theory with the Community of Inquiry (CoI) Survey. Some of the concepts, words, and phrases used to align the attributes to the CoI Survey

caused confusion, particularly with the attributes of trialability and complexity because respondents sometimes related problems in the physical world (such as administrators) or problems with social interaction to the question rather than focusing solely on the innovation.

The merging of CoI with Diffusion Theory within the research design was chosen intentionally because the use of virtual worlds for information delivery and the library profession is similar to distance learning and online educational platforms. The CoI Survey was designed to understand elements of three types of presence in online communities (cognitive, social, and teaching) which fit very well with virtual librarianship. Diffusion Theory can be applied to nearly any field, not only technological innovations; therefore assuring a match between a scholarly environment and the attributes of Diffusion Theory was deemed important. Basing the research study on a successful model was also important because simply addressing the five attributes of Diffusion Theory directly to those who have already shown evidence of adoption could be considered to promote bias. The purpose of merging the CoI Survey with Rogers' attributes, without labeling those attributes, was to allow the participants an opportunity to honestly address them. For many of the questions, no problems arose; and, for those which caused inferences to unrelated concepts (not addressing the innovation itself), the participants gave numerous examples which often matched the attributes clearly. For example, the 56 stated examples of obstacles faced obviously showed that the innovation was not initially easy for them. These examples clearly illustrated that the trialability factor was not a contribution to the adoption of the innovation.

In addition, the decision to focus research only on the attributes of Diffusion Theory created the problem of determining placement of the attributes of adoption within the hierarchy of social systems, such as libraries and institutions. Rogers' Diffusion Theory addresses authority and the hierarchy of social systems as they pertain to the adoption of innovations by dividing the decision process into three main types: (1) optional innovation-decisions, choices to adopt or reject by individuals, (2) collective innovation-decisions, choices to adopt or reject among members of a system, and (3) authority innovation-decisions, choices made by those in power or by a relative few with authority. This research study did not separate the adoption process into those types, which could be considered a limitation (Rogers, 2003, 38).

Some of the comments (personal anecdotes and examples) given by participants in the survey do not always appear to be relevant to Rogers' attributes; however, the participants were not given the labeled attributes in the survey. Although this could be viewed as a limitation, attribute labels were removed intentionally to make sure the librarians did not reply directly to each of the attributes which might lead to bias.

Importance of the Study

Findings from this study may help other librarians with the decision of whether or not to adopt virtual worlds as a tool for library services in the future. As virtual reality and virtual worlds continue to evolve, Second Life may continue to remain in the forefront or another virtual world may become the leader for use in education in libraries. Perhaps other technology trends will emerge that will make the use of virtual worlds

irrelevant in the future. Either way, this study has documented much of the work done by early adopting librarians who consider themselves pioneers in virtual worlds.

Future Research Needed

Research on virtual worlds is an expanding topic, full of numerous issues that will need to be studied in the future. Research on new media formats for information delivery includes digital content in 3D, virtual reality, and augmented reality. As these new formats become popular, librarians will seek new ways to bring information to patrons. As the Internet evolves, the Semantic Web will allow computers and information delivery platforms to interact seamlessly. Research will be required to understand how to provide the highest quality materials to library communities as user-generated content continues to flood cyberspace. Some librarians and educators are suggesting the importance of distinguishing the terms "library" and "librarian" which has been done in this research study. Physical libraries are no longer limited to finite space and are increasingly providing digital content. In an article emphasizing this important clarification of terms, Plutchak states, "It may be that the great age of libraries is waning, but I am here to tell you that the great age of librarians is just beginning. It's up to you to decide if you want to be a part of it" (Plutchak 2007, 90).

Studies on avatar behavior, as it applies to libraries and information seeking individuals, will contribute to understanding best practices for using in libraries, schools, and universities. More research is needed on avatar behavior as it applies to the profession of librarianship as well as information seeking behavior of library users.

Future studies might also explore avatar transparency, which is the range of anonymity one chooses or the disclosure of personal identifiers in the use of avatars. Building upon a study conducted at the University of Washington's Information School on establishing trust and credibility in virtual worlds, future studies might research avatar transparency (whether or not an individual chooses to remain anonymous or provide physical world identification) and also the use of multiple avatars (Morina et al 2010).

Results of this dissertation research also suggest additional research agendas on implementing resources into immersive learning. The next generation of library users will enter schools and libraries with new ideas about media having never seen a world without the Internet, smart phones, or video games. Anyone who has a child or has observed children in the past decade understands that immersive learning is an inevitable evolution for education. Research on immersive learning could result on findings about best practices for pedagogical strategies and standards for achievement of student success.

A future study might also be conducted on each of the attributes of Diffusion Theory as applicable to librarianship. Rogers' Diffusion Theory provides a detailed structure explaining factors that lead to the adoption of an innovation. This research study is one of the first to apply that structure to virtual world librarians. The attributes could be analyzed further with more specific questions designed for each attribute and matched to the stages of adoption with emphasis on communication channels and social structures. Analysis of the attributes could be identified as predictors for the process of adoption. Diffusion Theory can be applied to the adoption of an innovation by individuals; however, Rogers states, "In many cases, an individual cannot adopt a new

idea until an organization has previously adopted it" (Rogers 2003, 402). Research on the adoption of virtual worlds by organization might address three types: optional innovation-decisions, collective innovation decisions, or authority innovation decisions (Rogers 2003, 402). Optional innovation decisions are made by an individual outside the organization. Collective innovation decisions are choices to adopt or reject an innovation that are made by group consensus. Authority innovation decisions are made by relatively few individuals who have expertise or powerful positions in an organization (Rogers 2003). If the trend of virtual world librarianship continues, research studies on adoption could focus on the process of adoption by organizations.

Future studies could provide further research on the factors or attributes that *predict* adoption. As virtual worlds continue to evolve, potentially becoming easier to use (less complex), prediction of which attributes attract users might lead to identification of best practices.

Continued research on the adoption of virtual worlds could include hermeneutical phenomenology to closely examine the personal experiences of users (librarians). Through examination of the numerous comments, anecdotes, and examples provided by survey participants in this research study, it became apparent that understanding the reasons for adoption of virtual worlds is a personal decision with as many unique purposes as those that bring users into a physical library. The father of phenomenology is widely recognized as German philosopher and mathematician, Edmund Husserl. Husserl's philosophy differs from traditional empiricism because it intentionally disconnects from what he calls the "natural standpoint." Instead, what is perceived

(whether an object or an idea) is identified as an *epoche* through a "bracketing of existence." A key concept of Husserl's phenomenological philosophy is the term noema which is that which is perceived or given significant meaning (Stanford, 2007).

Hermeneutic phenomenology is both interpretive (hermeneutic) and descriptive (phenomenon). While not on the topic of virtual worlds, an article about methodologies used to investigate women's experiences with breastfeeding explains this method through the example of collecting and analyzing women's personal stories to determine factors about breastfeeding. When dealing with human experiences, a researcher is often required to interpret meaning derived from the priorities and perceptions of the individual as well as describe the phenomena at hand. Hermeneutic phenomenology, Spencer explains, is a fancy way of answering the question "how was it for you?" This model could be incorporated into virtual world research by observing librarians in the virtual world and collecting their personal stories. Data collected through individual interviews and observations could be analyzed for factors that contribute to adoption, to identify both advantages and disadvantages, and to illustrate successes and failures.

Phenomenological research is done with the intention of discovering life as it is lived which could be transferred into virtual lives as well as physical ones (Spencer 2008).

Budd argues that, although positivism has governed library and information science as an epistemological foundation for most of modern history, it is time for hermeneutical phenomenology to supplant positivism as means to advance critical inquiry (304). Adding the term *hermeneutics* to phenomenology introduces the process of interpretation to the described phenomenon and the experience of the individual.

More research needs to be conducted on both the advantages and the disadvantages of virtual worlds. Criticisms of virtual worlds include potential addiction, breaches in cybersecurity, privacy, cyber-bullying, and concepts of ethics and digital citizenship. Future studies might examine the negative potential of virtual environments as they relate to libraries and education. This study intentionally focused only on the professional aspects of virtual worlds in the field of librarianship. There are many psychological implications that arise through the use of avatars and also through the use of other technology applications that are emerging as virtual communities gain popularity in our digital culture. Future studies may be designed to research the connection of psychological and sociological elements of the use of avatars.

Finally, future research work will need to compare traditional library and information delivery services with those in virtual environments to better understand the relationship between physical world information needs and services, virtual world information needs and services, the separation of both and the augmented reality between them.

Conclusion

In conclusion, the focus of this research study was intentionally narrowed to the small group of librarians in the virtual world of Second Life, although there are many more individuals working in educational careers using virtual worlds (Kzero 2011). In order to understand the attributes contributing to adoption, it was decided that addressing one target group with a common purpose would provide the best results. The study

showed evidence of three attributes contributing to adoption: relative advantage, compatibility, and observability and documented evidence of initial difficulty in "trying out" the innovation along with a complex learning curve. These findings may be useful for understanding factors of adoption, for documentation of the efforts of early adopting librarians, and will lead to a better understanding of the future of virtual world librarianship in an age of rapidly changing technology trends.

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APPENDIX A
Pilot Study Survey

Virtual Worlds (Second Life): Libraries and Education

1. Demographic Information

Education and Professional Background

1. Gender

- Male
 Female

2. Age

3. My professional interest is mainly in the area of:

- Libraries
 Education
 Museums

Other (please specify)

4. Level of Education

- High School
 Some College
 Bachelor's Degree
 Master's Degree
 PhD

5. Virtual worlds for children (such as Webkinz or Club Penguin) are now popular. Rate your familiarity with virtual worlds for children.

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I am familiar (and/or know a child who has been active) with a virtual world designed for children.	<input type="radio"/>				

6. Rate your familiarity with virtual worlds used for education (such as Second Life).

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I am familiar with virtual worlds as an innovation which can be utilized for libraries, education and museums.	<input type="radio"/>				

Virtual Worlds (Second Life): Libraries and Education

2. Relative Advantage Questions

1. Rate how much you agree with the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I believe virtual worlds have benefits and advantages to offer the profession of librarianship and the field of education.	<input type="radio"/>				

2. Rate how much you agree with the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I have seen the results of other librarians and educators who have embraced virtual worlds as a tool for communication, sharing resources or collaboration.	<input type="radio"/>				

3. Rate how much you agree with the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I believe virtual worlds will be an important mode of communication and information delivery in the future.	<input type="radio"/>				

Virtual Worlds (Second Life): Libraries and Education

3. Compatibility Questions

1. How much do you agree with the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I perceive the exploration of virtual worlds as an important goal for librarians and educators.	<input type="radio"/>				

2. How much do you agree with the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I feel virtual worlds are compatible with the goals of the library profession to provide information and educational resources.	<input type="radio"/>				

3. How much do you agree with the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
In my opinion, virtual worlds are a natural extension for libraries (in consideration of tradition and past experience).	<input type="radio"/>				

Virtual Worlds (Second Life): Libraries and Education

4. Complexity Questions

1. Please rate your agreement with the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Disagree
I am comfortable with technological trends that are impacting libraries and education (Web 2.0, RSS, blogs, wikis, social networks and digital media creativity).	<input type="radio"/>				

2. Please rate your agreement with the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Disagree
I am comfortable with changes in technology tools, such as hardware upgrades, new software applications, and new innovations.	<input type="radio"/>				

3. Please rate your agreement with the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Disagree
I believe virtual worlds are easy to understand.	<input type="radio"/>				

Virtual Worlds (Second Life): Libraries and Education

5. Trialability Questions

1. Please rate your response with the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I have visited a virtual world for adults, such as Second Life, Active Worlds, or There.	<input type="radio"/>				

2. Please rate your response with the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I am currently active in a virtual world.	<input type="radio"/>				

If so, which one do you spend the most time visiting?

3. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I would consider committing time to learning in a virtual world as an innovation for libraries, education, and museums in the next year.	<input type="radio"/>				

Virtual Worlds (Second Life): Libraries and Education

6. Observability Questions

1. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I am aware of the work of librarians and educators in virtual worlds.	<input type="radio"/>				

Share examples here, if desired (Workshops, Immersive Learning Environments)

2. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I have witnessed advantages or disadvantages of virtual world innovation.	<input type="radio"/>				

Explain here, if desired

3. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
I have read literature on the subject of virtual worlds.	<input type="radio"/>				

Virtual Worlds (Second Life): Libraries and Education

7. Virtual World Tools

Describe your perception of tools available for immersive learning or information delivery (particularly in Second Life).

1. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Creation of an avatar gives an individual a sense of being "present" with others in a virtual environment.	<input type="radio"/>				

Additional comments (optional)

2. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Virtual World landmarks and SLurls (web-based landmarks) allow users (residents) to find educational places quickly.	<input type="radio"/>				

Additional comments (optional)

3. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Immersive Learning Environments can recreate historical eras, scientific procedures, and other simulations that benefit education.	<input type="radio"/>				

Additional comments (optional)

4. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
The ability to pass notecards to groups and individuals is an effective tool for education.	<input type="radio"/>				

Additional comments (optional)

Virtual Worlds (Second Life): Libraries and Education

5. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Machinima (filming within a virtual world environment) can be used to create educational media and archive virtual projects.	<input type="radio"/>				

Additional comments (optional)

6. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Digital exhibits (such as the Holocaust Museum or the Dresden Art Gallery) provide unique learning opportunities.	<input type="radio"/>				

Additional comments (optional)

7. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Live presentations (workshops, conferences or other events) may utilize multi-media, provide live real-time interaction, and are cost effective.	<input type="radio"/>				

Additional comments (optional)

8. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Weblinks delivered through virtual worlds help users (residents) navigate the Internet and provide educational content.	<input type="radio"/>				

Additional comments (optional)

Virtual Worlds (Second Life): Libraries and Education

9. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Virtual World Reference is an important service to library patrons in a new mode.	<input type="radio"/>				

Additional comments (optional)

10. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Virtual Worlds provide unique publishing opportunities for writers and artists.	<input type="radio"/>				

Additional comments (optional)

11. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Virtual World classrooms benefit learners who are separated by distance by giving them a sense of real-time interaction within a shared virtual space.	<input type="radio"/>				

Additional comments (optional)

12. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Virtual field trips provide learners with opportunities to visit unique places that they may not be able to visit physically.	<input type="radio"/>				

Additional comments (optional)

Virtual Worlds (Second Life): Libraries and Education

13. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Simulation of a library or classroom helps users (residents) relate new creative technology tools to past traditions such as the grand library buildings of long ago, which can be psychologically satisfying.	<input type="radio"/>				

Additional comments (optional)

14. Please rate your response to the following statement:

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Virtual groups provide users (residents) opportunities to collaborate globally with other librarians and educators.	<input type="radio"/>				

Additional comments (optional)

APPENDIX B

Community of Inquiry Survey

Source: <http://communitiesofinquiry.com/methodology>

Teaching Presence

Design & Organization

1. The instructor clearly communicated important course topics.
2. The instructor clearly communicated important course goals.
3. The instructor provided clear instructions on how to participate in course learning activities.
4. The instructor clearly communicated important due dates/time frames for learning activities.

Facilitation

5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.
6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.
7. The instructor helped to keep course participants engaged and participating in productive dialogue.
8. The instructor helped keep the course participants on task in a way that helped me to learn.
9. The instructor encouraged course participants to explore new concepts in this course.

10. Instructor actions reinforced the development of a sense of community among course participants.

Direct Instruction

11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.

12. The instructor provided feedback that helped me understand my strengths and weaknesses.

13. The instructor provided feedback in a timely fashion.

Social Presence

Affective expression

14. Getting to know other course participants gave me a sense of belonging in the course.

15. I was able to form distinct impressions of some course participants.

16. Online or web-based communication is an excellent medium for social interaction.

Open communication

17. I felt comfortable conversing through the online medium.

18. I felt comfortable participating in the course discussions.

19. I felt comfortable interacting with other course participants.

Group cohesion

- 20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
- 21. I felt that my point of view was acknowledged by other course participants.
- 22. Online discussions help me to develop a sense of collaboration.

Cognitive Presence

Triggering event

- 23. Problems posed increased my interest in course issues.
- 24. Course activities piqued my curiosity.
- 25. I felt motivated to explore content related questions.

Exploration

- 26. I utilized a variety of information sources to explore problems posed in this course.
- 27. Brainstorming and finding relevant information helped me resolve content related questions.
- 28. *Online discussions were valuable in helping me appreciate different perspectives.*

Integration

- 29. Combining new information helped me answer questions raised in course activities.

30. *Learning activities helped me construct explanations/solutions.*

31. *Reflection on course content and discussions helped me understand fundamental concepts in this class.*

Resolution

32. I can describe ways to test and apply the knowledge created in this course.

33. I have developed solutions to course problems that can be applied in practice.

34. I can apply the knowledge created in this course to my work or other non-class related activities.

5 point Likert-type scale

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

APPENDIX C

Dissertation Study Survey

Questionnaire Instrument (based on CoI)

Library & Information Literacy Presence

1. I first learned about Second Life (SL) from colleagues. Explain
2. I entered Second Life for professional reasons. Explain your reasons for entering SL.
3. I spend more time in SL for professional reasons, related to information literacy or librarianship than for other reasons. Explain

Facilitation

4. I believe my work in SL benefits the profession of librarianship.
5. I view my work as a virtual librarian as valid as my work in a physical library setting. Explain
6. Other librarians helped guide me towards engaging users in a virtual world environment in meaningful ways. Share examples, if desired.
7. I have collaborated on productive activities with other librarians in the virtual world. Describe

Direct Instruction

8. A mentor(s) encouraged me to explore new concepts and acquire skills.
9. I have served as a mentor to another librarian or colleague in a virtual world.
10. Another librarian or colleague provided feedback that helped me understand my strengths and weaknesses.
11. I plan to continue working as a virtual world librarian. If so, share some future goals?
12. I view my work as a virtual librarian as valid as my work in a physical library setting. Explain
13. I have observed other virtual world librarians contribute to the field. Can you give examples?

Social Presence

Affective expression

14. Getting to know other librarians gave me a sense of belonging inworld.
15. I was able to form distinct impressions of some SL librarians.

16. I feel that virtual world communication is an excellent medium for social interaction.

Open communication

17. I feel comfortable conversing through chat. Explain

18. I feel comfortable conversing using voice. Explain

19. I feel comfortable interacting with other librarians. Explain

Group cohesion

20. I was able develop a sense of trust with others. Explain

21. I feel free to disagree and express myself honestly inworld.

22. I feel my point of view was acknowledged by other librarians.

Cognitive Presence

Triggering event

23. Overcoming obstacles increased my interest in learning virtual world skill.

24. Mastering skills and observing creativity piqued my curiosity.

25. I felt motivated to explore information related questions.

Exploration

26. I utilized a variety of information sources to explore problems in the virtual world.

27. Brainstorming and collaborating with others helped me resolve content related questions.

28. Inworld (in SL) discussions were valuable in helping me appreciate different perspectives.

Integration

29. Combining new information helped me solve problems.

30. Learning activities helped me construct explanations/solutions.

31. I perceive my avatar as an extension of myself as a professional.

Resolution

32. I believe virtual worlds provide advantages beyond an online class for education and information seeking individuals.

33. I have developed solutions to information-seeking problems that can be applied in practice.

34. I can apply the knowledge created in Second Life to my work or other virtual world related activities.

35. I predict virtual worlds to continue to grow in the future. Explain how this will impact libraries.

36. Is there anything else you would like to share about your own personal experience in a virtual world?

5 point Likert-type scale

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

Appendix D

Dissertation Study Survey with Labeled Attributes

Questionnaire Instrument (based on CoI)

Library & Information Literacy Presence

1. When I first learned about Second Life (SL), it was easy to "try it out." [Attribute: Trialability 1]

2. I entered Second Life for professional reasons. [Attribute: Compatibility 1]

3. I spend more time in SL for professional reasons than for other reasons. [Attribute: Compatibility 2]

Facilitation

4. I believe my work in SL benefits the profession of librarianship. [Attribute: Relative Advantage 1]

5. I believe my work as a virtual librarian is in harmony with work in a physical library. [Attribute: Compatibility 3]

6. I have observed librarians engaging users in a virtual world environment in meaningful ways. [Attribute: Observability 1]

7. I witnessed or produced documentation of librarians collaborating in the virtual world. (Examples: literature articles, machinima, etc.) [Attribute: Observability 2]

Direct Instruction

8. I needed a mentor to explain concepts and master skills in a virtual world. [Attribute: Complexity 1]

9. I served as a mentor to another librarian or colleague in a virtual world. [Attribute: Compatibility 4]

10. Another librarian or colleague provided feedback which helped me understand my strengths and weaknesses. [Attribute: Compatibility 5]

11. I was able to test my role as a virtual world librarian through pilot projects. [Attribute: Trialability 2]

12. Major benefits of virtual world librarianship include gaining resources and information delivered in unique modes. [Attribute: Relative Advantage 2]

13. I have observed other virtual world librarians contribute to the field. [Attribute: Observability 3]

Social Presence

Affective expression

14. Getting to know other librarians inworld (in Second Life) gave me a sense of belonging. [Attribute: Compatibility 6]

15. I was able to form distinct impressions of some SL librarians. [Attribute; Observability 4]

16. I feel that virtual world communication is an excellent medium for social interaction. [Relative Advantage 3]

Open communication

17. I was able to converse inworld through text chat easily. [Attribute: Complexity 2]

18. I was able to converse inworld through voice easily. [Attribute: Complexity 3]

19. I was able to find and interact with other librarians in SL without a high learning curve. [Attribute: Complexity 4]

Group cohesion

20. I was able develop a sense of trust with others through virtual world experimentation. [Attribute: Trialability 3]

21. My early involvement gave me freedom to disagree and express myself honestly inworld. [Attribute: Trialability 4]

22. I observed a variety of perspectives and points of view inworld. [Attribute: Observability 5]

Cognitive Presence

Triggering event

23. Experimentation increased my interest in learning virtual world skills. [Attribute: Trialability 5]

24. My initial trial period in SL piqued my curiosity. [Attribute: Trialability 6]

25. I felt motivated to explore information related questions inworld. [Attribute: Compatibility 7]

Exploration

26. I tested a variety of information sources to explore potential library issues in a virtual environment. [Attribute: Trialability 7]

27. Brainstorming and collaborating with others inworld was beneficial in finding solutions. [Attribute: Relative Advantage 4]

28. *Inworld (in SL) discussions were valuable and helped me appreciate different perspectives.* [Attribute: Relative Advantage 5]

Integration

29. Combining different types of new information helped me solve complex problems. [Attribute: Complexity: 5]

30. Challenging activities in the virtual world helped me construct explanations/solutions for a variety of information needs. [Attribute: Complexity 6]

31. I view my avatar as an extension of myself as a person AND as a professional.

[Attribute: Observability 6]

Resolution

32. I believe virtual worlds provide advantages beyond an online class for education and information seeking individuals. [Attribute: Relative Advantage 6]

33. I easily developed solutions in SL to information-seeking problems that can be applied in practice. Attribute: Complexity 7]

34. The knowledge gained in Second Life benefits my work or other activities. [Attribute: Relative Advantage 7]

35. Because of what I have witnessed, I predict virtual worlds will continue to grow in the future. [Attribute: Observability 7]

36. The stage of adoption in virtual world librarianship that best describes mine is:

1= knowledge (understanding of virtual worlds in libraries, 2= persuasion (leaning toward using virtual world librarianship, 3= decision (choosing to begin virtual world librarianship for real library work, 4= implementation (working in a virtual world library, 5= confirmation (fully committed to vw library with real world application)

37. Is there anything else you would like to share about your own personal experience in a virtual world?

5 point Likert-type scale

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree