

PROVIDING CONTENT BY USING WEB-BASED DELIVERY METHODS: USING  
DIGITAL VIDEO, INSTRUCTOR-SELECTED WEBSITES, AND  
SEARCH ENGINES, TO DELIVER INFORMATION ABOUT  
THE PRINCIPLES OF BEHAVIORISM

The members of the Committee approve the doctoral  
dissertation of Andrew Stewart Quinn

Norman Cobb  
Supervising Professor

---

Richard Schoech

---

Charles Mindel

---

Peggy Quinn

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Ira Bernstein

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Dean of the Graduate School

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THE PRINCIPLES OF BEHAVIORISM

by

ANDREW STEWART QUINN

Presented to the Faculty of the Graduate School of  
The University of Texas at Arlington in Partial Fulfillment  
of the Requirements  
for the Degree of  
DOCTOR OF PHILOSOPHY

THE UNIVERSITY OF TEXAS AT ARLINGTON

December 2004

## ACKNOWLEDGMENTS

I would like to thank Dr. Norman Cobb for his guidance through out this project. I would also like to thank the members of my committee for their support and advice.

Many thanks to my friend Dr. Mike Prior who offered support and advice during the dissertation. This process was less complicated with his encouragement and friendship. In addition, I would like to thank Alan Howard and Russell Agne at the University of Vermont for assistance with and preparation of the dissertation.

I would also like to thank Jo Ann Stevenson for helping me ready my work to be submitted to the University of Texas at Arlington graduate college.

I would also like to thank my father for his endurance during this project. I would also like to think of my mother, whom, I hope is watching from above.

Finally, I would like to thank my best friends Rebecca, Hannah, and Lillian for allowing me the time to develop, write, and defend a dissertation. Sorry it has taken so long!

November 15, 2004

ABSTRACT

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Publication No. \_\_\_\_\_

Andrew Stewart Quinn

The University of Texas at Arlington, 2004

Supervising Professor: Norman Cobb

Currently, the social work literature demonstrates that students can learn on-line when the Internet is used. What was lacking was a comparative study that investigated which technologies students were willing to adopt. The current research indicates that, in general, students are satisfied with the delivery of content on-line. The goal of this research was to compare three delivery techniques: on-line video, a reading list (a collection of Websites on a topic), and a search engine.

Constructivist theory hypothesizes that students are responsible for their own construction of knowledge. Knowledge construction occurs when students either integrate new content into their existing understandings or change their existing understanding to accommodate novel understanding. Constructivist theory predicts that students will construct

knowledge from the different methods, but differences may occur due to students' involvement in the different methods.

The findings of this study indicate that all three delivery methods were able to facilitate knowledge construction at some level. The three groups varied significantly on the time they spent and how students were able to apply knowledge. Within the video group, participants had significantly different mean scores on a task to apply their newly acquired knowledge. The participants in the reading list group and the search engine group spent vastly different amounts of time constructing or developing their understanding of the material. Several variables, such as attitudes, perception of learning, time spent with delivery technique, and satisfaction, did have some influence on the students' knowledge construction. Ultimately, benefits and advantages for all the delivery techniques emerged. Open-ended comments made by the students, and personal observations made by the study's author, indicated that several guidelines are required to facilitate the use of on-line video, the reading list, and a search engine.

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## CHAPTER I

## INTRODUCTION

For the constructivist perspective, the learning process is a “self regulatory process of struggling with the conflict between existing personal models of the world and the discrepant new insights, constructing new representations and models of reality as a human meaning-making venture” (Fosnot, 1996, p. ix). The theory of constructivism postulates that learning is a student-oriented process where thoughts are being created and modified. When students are presented with a piece of curriculum-driven content, they can either integrate it with their prior understandings or they can readjust their understandings to make sense out of what they observed (Jonassen, Peck, & Wilson, 1999). The idea of knowledge construction can be applied to all levels of learning. Even simple mimetic tasks as memorization, learning someone’s name, or recall are subjected to a student’s knowledge construction.

Decisions as to what the learner commits to memory, the match between the original material and the way the learner perceives it, the purpose and duration for which the learner retains the information, the ways the learner does or does not apply the information, and the links to other knowledge that are made or not made. (Boethel & Dimock, 2002, p. 5)

Overall, constructivism is a theory about knowledge and learning and is used to describe how people learn (Fosnot, 1996).

The role of the instructor, as governed by constructivism, switches from a conduit of knowledge to a facilitator in the knowledge construction process. Instructors can facilitate the knowledge construction process by organizing the content in such a manner that promotes the negotiation of meaning by the student (Hanley, 1994). One way for instructors to assist students is to provide them with multiple understandings of a topic (Doolittle, 1999).

In the eyes of the constructivist, the subjective nature of the learning process is further facilitated by the fact that several viable understandings are relative to the exposed content. These representations are based on the differences in culture, community, and individual experience (Doolittle, 2002). Engaging students with multiple perspectives creates a complex set of interrelated experiences to which an individual must “construct intersections in order to make meaning from a potentially disordered set of circumstances” (Doolittle, 2002, p. 12). The learning process is mediated by the student’s success in negotiating the contradictions and the synthesizing of these opposing views into accepted, viable constructs (Murphy, 2003).

The Internet is one tool that instructors can use to encourage the constructivist learning process. Due to sheer volume, the Internet provides unprecedented access to local and global perspectives (Doolittle, 2002). Instructors can utilize several on-line technologies to facilitate access to various perspectives. For example, encouraging students to communicate over electronic communication, watching on-line videos, reading Web pages, or using search engines exposes them to viewpoints necessary in the negotiation of meaning. Overall, one can turn to the Internet as a tool to facilitate the knowledge construction process.

### Background

Social work education has made use of the Internet since the late 1980s when Flynn (1987) used electronic communication to provide a medium “whereby the power of computing can be used for simulating social policy processes” (p. 25). Since then instructors have used the Internet to disseminate content in several social work courses, such as Human Behavior and the Social Environment (Barnett-Queen & Zhu, 1999; Johnson & Huff, 2000;

Frey, Faul, & Yankelov, 2003), research methods (Frey et al., 2003; Stocks & Freddolino, 1998; Stocks & Freddolino, 2000; Cook & Brady, 1998; Wernet, Olliges, & Delicath, 2000), technology supported practice (Schoech, 2000), advanced family practice (Ouellette, Sells, & Rittner, 1999), community practice (Crook & Brady, 1998; Kost & Sturman, 1999; Schoech & Helton, 2002), mental health (Knowles, 2000), social welfare law (Sarnoff, 2003), organizational theory (Latting, 1994), diversity (Huff & Edwards, 1999), social welfare policy (Johnson & Huff, 2000), social work history (Faux & Black-Hughes, 2000), and psychopathology in clinical practice (Cook & Brady, 1998).

Social work research literature describes learning as an outcome of effectiveness when content is disseminated on-line. In other words, research looked at whether disseminating curriculum-based content on-line was an effective method to facilitate the learning process. For example, Stocks and Freddolino (1998) used course grades as an outcome measure. They found that students who received content via the Internet (n= 24) performed slightly higher than a classroom section (n=36). Also, Faux and Black-Hughes (2000) reported an improvement from pre- to post-multiple choice scores when content was delivered on-line.

Several different types of learner variables have been examined to assist social work instructors in understanding how and why on-line delivery is effective in the learning process. These include learning styles (Barnett-Queen & Zhu, 1999; Frey et al., 2003); attitudes about computers (Stocks & Freddolino, 1998; Stocks & Freddolino, 2000; Barnett-Queen & Zhu, 1999; Frey et al. 2003); student demographics (Schoech, 2000; Knowles, 2000; Wernet, Olliges, & Delicath, 2000; Faux & Black-Hughes, 2000); time spent

interacting with the technology (Knowles, 2000); and attitudes about the delivery of content on-line (Schoech, 2000). A small body of social work research considered student perceptions as a contributor to the measure of effectiveness. However, these studies, such as Frey et al. (2003) or Knowles (2000) adopted a method of looking at the use of the Internet to organize class activities (e.g., syllabi, communication between instructors and students, posting class assignments) rather than the relationship between how a student perceives learning on-line and whether they actually learn content.

While Internet technologies have experienced wide implementation in the social work classroom, most of the instructors have relied on some form of electronic communication to disseminate their content. In a recent review of conference proceeding where on-line dissemination was the topic, Schoech (2002) noted that electronic communication seemed the most commonplace. The electronic communication technologies that have been used by social work educators include email (Flynn, 1987; Finn, 1994; Huff & Edwards, 1999; Stocks & Freddolino, 1998); discussion forums (Barnett-Queen & Zhu, 1999; Cummings & Bonk, 2002; Seabury, 2003); listserv (Huff & Edwards, Johnson & Huff, 2000); and chat (Schoech, 2000; Schoech & Helton, 2002). Overall, electronic communication works well to enhance the student's learning process (Schoech, 2002). Furthermore, the learning process was enhanced by increasing the sharing of ideas (Cummings & Bonk, 2002), group cohesion (Seabury, 2002), and promoting a positive learning experience (Flynn, 1987).

The World Wide Web (WWW) is another Internet tool tapped by social work instructors. The World Wide Web is a subset of Internet nodes where access is gained using a graphical protocol such as Netscape or Internet Explorer (Schoech, 1999). The WWW can

also be viewed as a collection of “pages” that incorporate “many of the essential properties of both print and voice/presence media” (Chu & Chan, 1998). A Web page has a Web address similar to a person’s postal address. A Web address consists of the location where the Web page is stored. This address is called a uniformed resource locator or URL. Web pages can be designed to be very simple, consisting of a few hyperlinks and the presentation of text or they may contain audio clips, images, videos, and other various forms of multimedia technologies. Internet sites using the WWW protocol usually begins with *http://www*. While electronic communication via a Web page is vitally important, the focus is on other ways of using the WWW to provide content.

Stocks and Freddolino (2000), Kost and Sturnman, (1999), Galambos and Neal (1998), and Miller-Cribbs and Chadiha (1998) are some of the social work instructors who have organized curriculum-driven content for dissemination using the WWW. For example, Stocks and Freddolino created a Website that provided immediate feedback to students. Students were quizzed about content they reviewed on-line. When students selected their answer, a feedback window appeared. If the student did not understand the feedback, he/she was given the opportunity to communicate electronically with either the instructor or through a discussion group with their peers.

Another Web-based example comes from Kost and Sturnman (1999) who created a virtual village to conduct neighborhood-needs assessments and interventions. The virtual village consisted of pictures of local neighborhoods and census information. To make the experience more realistic, the authors randomly emailed out a situation or problem that could sabotage the success of any intervention. The groups, acting as a network of agencies, had to

collaborate through email and discussion groups to resolve the issues. Kost and Sturman concluded that the virtual village was an appropriate medium to use in a community practice course, because students were able to gather information and practice the skills they would be using when conducting a neighborhood-needs assessment. In addition, it allowed students a simulation in which they could become familiar with the neighborhood before going into the field.

Galambos and Neal (1998) used a Web page to simulate the movement of an issue through congressional debates. Students had access to a Java-based federal budget, an on-line newspaper, and background information on the importance of the issue. The authors believed that existing information available on the WWW would educate undergraduate social workers about policy and macro issues, such as state and federal legislation, Supreme Court decisions, and public opinion.

Miller-Cribbs and Chadiha (1998) used existing on-line materials to introduce the WWW to their students. Students from several sections of a diversity course found Web pages using hyperlinks to resources for diverse populations. The exercise demonstrated how the WWW could facilitate lessons about advocacy, community empowerment, and social change.

Still other social work professors have migrated instruction to the WWW using an organizational on-line template or course shell package (Wernet et al., 2000; Knowles, 2000; Cook & Brady, 1998). A Web-based shell, which is similar to a template, is an easy to use software package that helps instructors maintain an interface with their students through the WWW (Wernet et al., 2000). These reports, however, fall short because they focus on the

organizational aspect of the course package rather than its use to organize the dissemination of curriculum driven content. For example, Cook and Brady used Construe, a Web-based shell specific to their university, to provide an on-line environment that allowed their students to follow links to course materials, post reactions to materials, and email the instructor and other students. Students used Construe to: (1) arrange site visits, (2) use as a portal to the WWW, (3) post preliminary research results, (4) pose questions to other students, and (5) work together on program evaluations (Cook & Brady, 1998).

Overall, findings on the use of the WWW as a content dissemination tool are positive. These findings include the fact that using the WWW to organize content promotes social work skill development (Kost & Sturman, 1999), works well to enhance student's views of diversity by exposing them to international and global viewpoints (Miller-Cribbs & Chadiha, 1998; Ouellette, Sells, & Rittner, 1999), enhances knowledge about other aspects of the WWW (Knowles, 2000), functions as a forum for interactive learning (Stocks & Freddolino, 2000), enhances course work (Cook & Brady, 1998), and promotes computer skill proficiency (Stocks & Freddolino, 2000). Interestingly, Wernet and colleagues (2000) discovered that graduate students found academic use of the WWW more beneficial than undergraduates, and Knowles demonstrated that Web-based delivery appears to be more beneficial for nontraditional students.

#### Need for Further Research

The incorporation of the Internet into social work education does not seem problematic and appears to be overall beneficial. Despite the wealth of reported success, several shortcomings appear in the literature. First, most of the research is anecdotal.

Almost exclusively, all the reports were summations of a semester-long course experience. Second, attempts were made to offer empirical descriptions, but most of the research suffered from low sample sizes and insufficient power. Third, sampling was not random. All three of the above points make generalization to other scenarios difficult.

A final issue with the social work literature is that no comparative investigation of the varying technologies exists. Currently (and as this review shows), research has demonstrated that use of the Internet and its accompanying technologies have met with success and offers a wide range of benefits in its use. To date, no comparative social work piece has appeared that guides instructor decisions regarding “which strategies yield the most desirable outcomes for students” (Frey et al., 2003, p. 444).

#### Summary of Current Project

The current research project builds on the existing literature and moves on to focus on a comparison of the various delivery methods to explore the potential variance in students’ ability to learn curriculum-based information. The project addresses an interest in the literature for comparative studies about on-line technologies delivering social work content (Frey et al., 2003; Hollister, Freddolino, & Macy, 2001; Schoech, 2000). For example, Frey and colleagues suggested that comparative research studies are needed to help instructors decide which technologies to adopt that yield the most desirable outcome.

Internet technologies are ever changing and research needs to stay on top by continuously examining new and novel ways to deliver content on-line. While several different methods of using the Internet to facilitate the constructivist learning process exist, three methods have not received much attention:

1. content via video,
2. instructor-selected Websites, and
3. search engine technologies to discover content.

Research must also consider how certain factors affect students' ability to construct knowledge when content is delivered on-line. The literature indicates that several variables should be considered when examining whether or not an on-line delivery method is effective (Dean, Biner, & Coenen, 1995; Schoech, 2000). Focus should include the learner, instructor, presentation, content, outcomes, and environment in which the technology exists and is supported.

Chapter 1 presents background information about how, historically, social work instructors have attempted to use the Internet to deliver content. Chapter 2 will present the theory of constructivism and how such a theory can be used to understand how people learn and obtain knowledge.

## CHAPTER II

### SUMMARY OF THE LITERATURE: CONSTRUCTIVIST THEORY

Constructivism is a theory about knowledge and learning; it describes both what individuals know and how they come to know it (Fornost, 1996). The epistemology of constructivism assumes that the acquisition of knowledge is an active process in which the meaning or reality behind the presented materials is constructed (Merrill, 1991). In fact, an often cited tenet of constructivism is that “knowledge is not passively accumulated, but rather, is the result of active cognizing by the individual” (Doolittle, 1999, p. 6). This tenet is echoed throughout the epistemological discussion on constructivism (Lefoe, 1998; Jonassen, Mayes, & McAleese, 1994; Jonassen, 1991; Jonassen, 1994). For the constructivist, no universal truth exists, only what is known or claimed to be known by the learner. Reality is whatever the person constructs (Merrill, 1991).

While learners arrive at different understandings, constructivism is not just a matter of “anything goes” (Spiro, Feltovich, Jacobson, & Coulson, 1991). Some representations share common meanings. These representations are culturally negotiated and relatively permanent. Constructivists believe that much of reality “is shared through a process of social negotiation” (Jonassen, 1994, p. 35.) The litmus test for constructed meaning becomes the ability to justify a position and to establish a viable understanding of a concept in a given context (Cognition and Technology Group, 1991).

The constructivist view of knowing contrasts sharply with the objective view. For the constructivist, the meaning assigned to curriculum-based content is delegated and regulated by the learners, whereas, in the objective view of knowing, meaning is a universal truth

known and agreed to by all. In the objective view, meaning exists outside of the student (Jonassen, 1991) and adheres to a “singular reality” (Doolittle, 2002, p. 5). For the constructivist, the singular reality is a dynamic concept that is susceptible to negotiation and reinterpretation, thus, making the constructivist view of knowing subjective in nature (Boethel & Dimock, 2002). Furthermore, constructivists view the learner as an active organism who engages, grapples, and seeks to make sense out of things, as opposed to the idea that a learner is just responding to a stimulus (Perkins, 1991).

Understanding How Knowledge Construction  
Occurs: The Constructivist  
Learning Process

The constructivist believes that meaning making or the learning processes is a negotiation that is embedded in the reliance on prior understandings and experiences integrating with newer understandings and explanations. Hanley (1994) states:

Students come into a classroom with their own experiences and a cognitive structure based on those experiences. These preconceived structures are either valid, invalid, or incomplete. The learner will reformulate his/her existing structures only if the new information or experiences are connected to knowledge already in memory. (p. 2)

The learning process involves cognitively confronting inconsistencies (Wilson, Teslow, & Osman-Jouchoux, 1995) and is a function of the interaction between people’s prior experiences, cognitive structures and beliefs, and the new information (Jonassen, 1994).

Another tenet of constructivist theory describes the learning process as adaptive (Doolittle, 1999). Brooks and Brooks (1993) sum up the adaptive function of constructivist learning by stating that “each of us makes sense of our world by synthesizing new experiences into what we have previously come to understand” (p. 4). Learning is said to

occur when novel information is integrated into a student's existing knowledge base or the existing knowledge base is remolded to accommodate the new piece of information.

The belief that learning is adaptive in nature is based on the works of Piaget, the Swiss developmental psychologist. Piaget believed that humans construct their knowledge through the creation of schemas, a collection of experiences, which are changed, expanded, and made more sophisticated through the processes of assimilation and accommodation (Chen, 2000). Assimilation refers to the process of organizing a novel concept with existing logic structures or understandings. Accommodation refers to the reflective and integrative process that serves to change people's cognitions and explicate the content for learners to construct new understandings (Fosnot, 1996). The learning process occurs by comparing, filtering, and assessing new knowledge against prior experiences and understandings to establish a consistent or integrated understanding (Boethel & Dimock, 2002). This desire to achieve equilibrium in understanding serves as the catalyst for the constructivist learning process. Overall, the opportunity for learning occurs when learners encounter inconsistencies with their prior understandings (Boethel & Dimock, 2002).

Even mundane tasks such as memorizing or recalling tasks are subjected to knowledge construction. For example, Perkins (1991) explained that concepts like learning a new friend's name or learning a new term in a foreign language is subjected to the knowledge construction process. Perkins stated that when a learner encounters novel content, "mental processes are formed, elaborated, and tested, until a satisfactory structure emerges" (p. 20). Boethel and Dimock (2002) elaborated further on the idea that memorization is constructivist in nature. Learners make active decisions on what to commit

to memory, matching the content to prior understandings, the purposes and the duration in which the information is retained, and how they apply the content. Finally, Honebein, Duffy, and Fishman (1991) applied the concepts of constructivism to reading a passage in a book. Honebein et al. (1991) argued that students have to make decisions on what information to attend to, how to organize the information, and what information is to be accommodated into or assimilated with existing understandings.

The constructivist view of the learning process contrasts with the objective traditional view. In the traditional view, the learning process is a function of requiring the student to know and understand the entities, attributes, and relations that exist (Duffy & Jonassen, 1991). Furthermore, the objectivist learning process assumes that observation, listening to instructor lectures, and engaging in the practice of a concept will result in learning (Fosnot, 1996). This perspective does not support the cognitive construction process postulated by the constructivist.

### Facilitating the Knowledge Construction Process

Constructivist learning theory asserts that instructors serve as guides that aid students to evolve or develop meaning (Doolittle, 1999). The instructor's role shifts from a conveyer of knowledge to a guidance role in the constructivist-driven learning situation, (Ouellette, 2000). In fact, effort on behalf of the instructor needs to be put into facilitating the construction process itself and not into guiding the student toward a particular understanding.

The constructivist learning process is facilitated by the exposure to divergent views on the same topic. In fact, another cited tenet of constructivism is that exposure to varying perspectives forces students to negotiate meaning within the opposing views (Shank, 2000;

Wilson et al., 1995; Duffy & Jonassen, 1991; Merrill, 1991; Jonassen, 1994; Doolittle 2002). If knowledge (meaning) is specific to the student, then there are many meanings or perspectives for any one piece of content (Duffy & Jonassen, 1991). Therefore, the presentation of these varying individualistic perspectives can facilitate the negotiation involved in knowledge construction. Merrill (1991) states that “conceptual growth comes from sharing of multiple perspectives and the simultaneous changing of our internal representations” (p. 46). Furthermore, Doolittle (2002) argues that presenting various perspectives “creates a complex set of interrelated experiences to which an individual or group must actively construct intersections to make meaning from a potentially disordered set of circumstances” (p. 12).

The constructivist believes that each understanding gives the students various routes from which to retrieve knowledge (Doolittle, 1999). Even in the case of shared realities, some deviation exists as to how learners interpret, apply, and share their understanding of the common understanding. In summary, exposure to various realities can promote reconstruction and reorganizing of existing knowledge as a result of being exposed to new interpretations (Murphy & Laferriere, 2003).

### Summary

This study is organized around the beliefs that:

- knowledge is actively constructed by learners
- shared understanding or reality of concepts, ideals, and beliefs exists
- learning is adaptive—the learning process involves a negotiation between prior understandings and novel information.

- presenting various understandings to students facilitates the knowledge construction process

Overall, constructivism is a theory that explains how learners construct knowledge. The theory argues that students construct knowledge by a negotiation process. This process involves the Piagenian concepts of assimilation and accommodation. Students make sense out of content by taking in various understandings and assimilating the various views into their preexisting understandings or changing their preexisting understandings to accommodate the novel information (Wilson et al., 1995). Constructivists believe that shared realities evolve through social and cultural negotiation. However, because of the subjective view of meaning, each learner may have a slightly different interpretation of the shared reality. One way to foster the constructivist learning process is to expose students to alternative perspectives, thus giving them content to use for negotiation (Doolittle, 2002).

Chapter 2 explains the tenets of constructivism and how knowledge is constructed. Ideas for organizing content in such a manner to foster the construction of knowledge are suggested. Chapter 3 offers an understanding of how to use the Internet to facilitate the knowledge construction process.

## CHAPTER III

## SUMMARY OF LITERATURE: INTERNET DELIVERY METHOD

The Internet is a technological tool that can be used to facilitate the negotiation processes postulated by constructivist theory. Within the Internet structure, literally millions of pieces of information are available to students. In this process of discovery, various students construct individualized perspectives of the topic. While students negotiate their divergent and complimentary findings, the learning process evolves and reflects the process hypothesized by constructivist learning theory.

Content for knowledge construction can be discovered in two different ways on the Internet. Communication is the first source of knowledge. Communicating with peers “provides for the development of socially relevant skills and knowledge, as well as providing a mechanism for perturbations that may require individual adaptation” (Doolittle, 1999, p. 4). Constructivists believe that knowledge construction can result in negotiation in social situations. Students who engage in social communication will find that the perspectives generated will serve to verify or contradict their existing frameworks (Doolittle). Internet tools that foster communication include email, chat, listservs, discussion groups, and instant messaging. On-line communication can be either synchronous (communication occurs in real-time) or asynchronous (a form of interaction over a computer network where-by participants join the interaction at any time (Schoech, 1999, p. 409).

The second way for the Internet to facilitate the knowledge construction process is to rely on the wealth of information available on the World Wide Web (WWW). The WWW is a set of Internet nodes that are accessible by a graphics-based browser such as Netscape and

Internet Explorer (Schoech, 1999). The WWW is similar to the concept of a library. Students in libraries access information by pulling books out of the stacks; however, on the WWW; they browse to a Web page. In both situations, students gain access to another person's view, which then can be used for knowledge construction.

The WWW can provide the learner with many paths, including browsing and selecting information, taking virtual journeys, and exploring alternatives (Shank, 2000). Doolittle (1999) believed that one of the strengths of the WWW is to provide students with multiple understandings of a topic. The students with access to the WWW have easy access to international and culturally diverse resources, including diverse populations (Doolittle, 1999). With the constant growth of the WWW in size, new perspectives will constantly be added and delivered using the WWW. The WWW is ideal for the constructivist approach, because the WWW allows learners to navigate, create, and construct a unique knowledge base that can be used in the negotiation process involved in knowledge construction (Conceicao-Runlee & Daley, 1998).

Movement within the WWW is driven by hypermedia. Hypermedia is "an electronic publishing form that allows users to easily browse a document by jumping from one subject to another nonsequentially" (Schoech, 1999 p. 423). When browsing, students click on links that take them to content in the form of text (hypertext), data, graphics, pictures, video, and other media.

### Electronic Communication

Internet tools that facilitate electronic communication are often used by social work instructors who have ventured into on-line education. In fact, in a review of several social

work conference proceedings, Schoech (2002) focused on electronic communication. Table 1 demonstrates which of the communication technologies have been used by social work instructors.

Table 1 Communication Technologies Used to Foster Learning

| Technology   | Authors              | How the Technology was Used   | Results   |
|--------------|----------------------|---|---|
| <b>Email</b> | Flynn, 1987          | Required students to mimic inter-agency collaboration to develop a case plan.   | The shared meaning developed from communicating further facilitated the class to conduct mock hearings, and legislative testimony.  |
|              | Latting, 1994        | Encouraged students to join an email conference and use email with the class and instructor.  | Found that the volume of email produced by the conference was overwhelming and distracting because of the low caliber of the messages. Also, students complained that email took away from face to face experience. |
|              | Finn, 1995           | Facilitated communication between instructor and student. Demonstrated how email can be used to facilitate case management and coordination among agencies. | Found that students communicated ideas, needs and feelings which might not be expressed using conventional methods.   |
|              | Huff & Edwards, 1999 | Used email to pair students so they could discuss topics of diversity.  | Found that 18 out of 37 students believed that the learning process was enhanced when they were paired with a peer to discuss diversity.  |
|              | Johnson & Huff, 2000 | Facilitated communication in social welfare policy by assigning email journal partners.   | Positive opinions were recorded for use of email, but email received little use for the discussion of class content (6 emails out of 388 were sent that   |

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|                 |                           |   |   |
|-----------------|---------------------------|---|---|
|                 |                           |   | were related to content   |
| <b>Listserv</b> | Huff & Edwards, 1999      | Facilitated discussions about diversity readings between peers and across sections of classes.  | 24 out of 37 students felt that the learning process was enhanced by the use of the listserv.   |
|                 | Johnson & Huff, 2000      | Facilitated communication in a social welfare course and an HBSE course.  | Found that the use of listservs encouraged students to assist their peers, carry out discussions beyond class time, and enhanced their learning experience. |
|                 | Stocks & Freddolino, 1998 | Facilitated discussion about research methods by posting questions and comments about weekly readings and lectures.   | On-line discussions have similar facilitating features as in-class experiences.   |
|                 | Stocks & Freddolino, 2000 | Facilitated discussion by creating a question hyperlink that when clicked, allowed students to email the professor for assistance or post their question to a listserv. | Found that adding a hyperlink for posting to a listserv made it easier to create an active learning environment for students.                               |
|                 | Schoech, 2000             | Used a listserv to facilitate conversation in a Technology Supported Practice Course.   | All students (N=8) found that the listserv to be helpful.   |
| <b>Chat</b>     | Schoech, 2000             | Used chat to facilitate conversation between students in a Technology Supported Practice Course.  | Found that chat was a viable alternative for class discussion, but technical difficulties hindered its use.   |

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|  |               |   |  |
|--|---------------|---|--|
|  | Knowles, 2000 | Used chat to encourage synchronous communication among students in a Mental Health Intervention course. | All students (22) found that chat enhanced learning. |
|--|---------------|---|--|

|                              |                           |  |   |
|------------------------------|---------------------------|--|---|
| <b>Discussion<br/>Groups</b> | Schoech & Helton, 2002    | Used chat to facilitate communication in Introduction to Human Service Administration. Facilitated discussions about HBSE.   | Found that students responded negatively to group collaboration over chat. Authors point out this was due to technical difficulties. Found that students learning on-line found the discussion group as helpful as students learning in a face-to-face environment. |
|                              | Barnett-Queen & Zhu, 1999 |  |   |
|                              | Kost & Sturman 1999       | Facilitated communication with social workers and non-social work students in the area of Advanced Policy Development.   | Found that students networked to build confidence and skills.   |
|                              | Knowles, 2000             | Facilitated discussions on topics about Mental Health Intervention.  | The benefits of the discussion group include sharing knowledge, reading others work, reflective learning, facilitating deeper levels of communication and intimacy, and more thoughtful responses.  |
|                              | Santhiveeran, 2000        | Facilitate discussion in research methods, and statistics and computers.   | Found that the discussion group served as a catalyst for further peer to peer discussions outside of campus.  |
|                              | Schoech, 2000             | Used a discussion group to facilitate conversations about technology supported practice.   | Found that discussion group suffered from problems. Students did not follow through with posts. One suggestion was to appoint a facilitator for each question/topic.  |
| <hr/>                        |                           |  |   |
|                              | Cummings & Bonk, 2002     | Facilitated a debate in which students were invited to offer their ideas, rebuttals, and reflections. Also used discussion groups to facilitate international conversations. | Noted that students within cohorts develop close relationship.  |

|                  |   |  |
|------------------|---|--|
| Seabury,<br>2002 | Facilitate communication<br>between students about<br>working with groups and<br>interpersonal practices. | The discussion contributed to the<br>building of group cohesion. |
|------------------|---|--|

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Electronic communication has been used to facilitate knowledge construction in a social work environment. First, Latting (1994) asked students to join an email conference, noted that students expressed how much they valued receiving expert help from others across the country. Second, Santhiveeran (2000) suggested that “online communication enhances instructors’ efforts to help students construct new knowledge and reconstruct existing knowledge” (p. 6). Electronic communication is one set of on-line technologies that can facilitate the negotiation of meaning and learning.

#### Web-based Delivery

The WWW can deliver content through various methods. Web pages can be created that provide interactivity (such as simulations), multimedia (audio, video), and text. Web-based delivery differs from that of electronic communication. In electronic communication, the intent is to use technologies to communicate between individuals. Web-based delivery technologies are used to present information one-way; the premise is not communication, rather the one-way delivery of content. The World Wide Web has a variety of technologies that assist in the delivery of content. For example, images combined with text on a Web page or a video embedded into a Webpage coupled with several thought questions presents a student with content necessary for use in knowledge construction. Unfortunately, with social work focusing mainly on the commutative features of the Internet, there is not yet a great

deal on the use of Web base delivery technologies. Table 2 demonstrates how the World Wide Web has been used by social work instructors.

Table 2 Web Delivery Technologies Used to Foster Learning

| Technology   | Authors                        | How the Technology was Used  | Results  |
|--|--------------------------------|--|--|
| On-line simulations                                  | Galambos & Neal (1998)         | First, students took on the role of president of the United States and make policy decisions and second, students took on the role of constituencies and developed a congressional ballot.                 | Authors failed to discuss student reactions or describe how exposure to content on the web enhanced or hindered the learning process.  |
| Web Pages & Search Engines                           | Miller-Cribbs & Chadiha (1998) | (a) Students were asked to locate websites relevant to human diversity and conduct a thorough investigation of the resources available; (b) Students were asked to search the Internet on course concepts. | Students reported that exposure to various websites gave them access to different views on diversity.  |
| Simulation of Neighborhood; Collection of Hyperlinks | Kost & Sturman (1999)          | (a) Authors created a website using maps, images of neighborhoods and census data; (b) Students were asked to collect hyperlinks referencing the practice of social work.                                  | Authors failed to go into any detail on how the neighborhood simulation or the hyperlinks fostered the construction of knowledge.  |
| Hyperlinks to Websites                               | Schoech (2000)                 | Described a scenario where links to web pages were provided during an on-line chat session.  | Failed to discuss how the learning process was affected. Did state that the class, as a whole, found using the WWW an effective method to illustrate a concept while engaged in an on-line chat. |
| Web  | Faux and                       | Delivered content on social  | Did not describe whether the   |

|                  |                    |   |  |
|------------------|--------------------|---|--|
| Pages            | Black-Huges (2000) | work history via a webpage.   | content was delivered via text, text with hyperlinks (allowing students to follow logical paths by clicking on a link), audio, and/or video. |
| Video simulation | Seabury (2003)     | Created client simulations and distributed them via video on a webpage. | Students reported learning, but felt hindered by technical issues.   |

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Several prevalent technologies were seldom discussed in the social work literature. For example, on-line video was hardly described as a method for facilitating the learning process. Also, search engines, a technology that allows students to seek out and discover content in a self directed fashion, were not even mentioned. Current research needs to focus on the different novel Web-based technologies (Schoech, 2000). This call for research into Web delivery strategies has been echoed by other social work researchers such as Frey et al., 2003, and Hollister et al., 2001.

Three Web Delivery Strategies: On-line Video, Instructor-selected Websites, and the Search Engines

Three relatively unexplored methods used in the WWW to disseminate content are a pre-selected collection of hyperlinks, search engines, and digital video. First, instructors might comb the WWW for a variety of interpretations of a topic. The web pages can be compiled into a reading list. Students are then directed to a collection of hyperlinks. Next, students are directed to a search engine. Students become responsible for picking and choosing which sites to explore. Finally, digital video can deliver images about a topic. This

video can be distributed to students via the WWW. Each method is capable of delivering content so that knowledge construction can occur.

*Digital video clips:* Using video clips is another way to deliver diverse information to students. Video offers students visual representations that are difficult to replicate in plain text. Students can browse to a Website and watch prerecorded clips of experts discussing curriculum relevant material. Since video clips are distributed on-line, students have access to a wide range of cultural perspectives and diverse sources. Also, because the way the clips are placed on the Webpage, students are given control over the viewing. They can rewind, fast-forward, pause, and stop. Finally, digital videos suffer no loss of quality, meaning they can be played over and over again and they retain a sharp image.

On-line video requires a great deal of planning, because many steps and considerations are needed to create the video and make it available to students on the WWW. Therefore, an understanding of the digitizing, editing, and distributing processes is helpful.

Digitizing. All video needs to be digitized for use on-line (Adobe, 2004). The endless amount of motion, colors, sounds, and shapes needs to be converted into a language that the computer understands. This language, Binary, consists of ones and zeros. Digital video is based on instructions that tell the computer how to interpret the Binary information, thus recreating the video on the computer screen (Adobe, 2004).

Video filmed with a digital video camera is already digitized. Analog video (VHS, Beta) needs to be converted. A digital video capture device (usually a video capture card) is needed to perform the task. Currently, on the consumer market are analog-to-digital encoding devices (Dazzle, Pinnacle, and ATI) that plug into your computer. VCRs and other

analog devices can be hooked up to this device. The end result is a digitized video. The ability to digitize analog video is an attractive feature for the instructor who has content on VHS tapes. Computer software is needed to work with the digitizing device to capture the digital video and store it on the hard disk of the computer. Frequently, the software needed for editing has a method of moving the video from the captured device to the computer.

Editing. The editing phase gives the instructor the opportunity to mold the captured video into a distributable product. During this stage, the instructor has the opportunity to edit out any glitches or unnecessary dialogue. The consumer editing software package allows for captured video to be edited in a non-sequential fashion. Film footage, therefore, can be edited to produce a final product. The editing process also includes transitioning scenes together and adding titles. In addition, effects, such as brightening colors and applying septa, can be applied. An instructor, who filmed five cultural definitions of marriage, can isolate five highlights from each interview and put them together for a retrospect.

Distribution. Video can be distributed on-line in two different ways (Schoech, 2002). First, video can be downloaded and played. In this situation, the student downloads the entire video file and then plays it back. One benefit to downloaded videos is that they can be stored on the student's computer. The student can then watch the video independently of being connected to the Internet. The download delivery mode can suffer from slow download times (Schoech, 2002).

The second delivery method, streaming video, offers an alternative to downloading videos. The video stream is stored on a streaming media server, such as Real Player Server or a streaming QuickTime server. Clicking on a hyperlink in a Webpage calls the server to

deliver the video to a media player. A streaming media player (QuickTime, Windows Media, Real Player) is used by the student to view the video. The stream is measured in kilobytes per second (kbps). This measure, called bit rate, refers to how fast the bits of data travel from the server to the player. As soon as the bits of data are received, the video begins to play. Since the flow of data is continuous and the video plays smoothly and continuously, streaming video offers an effective alternative to downloaded videos. However, unlike downloaded video, students cannot save streaming videos to their desktop for later playback.

The quality of the video is dependant on the bit rate. The three main factors that make up bit rate are the frame rate of the video, the resolution, and the compression.

1. **Frame Rate:** Videos are a collection of ordered stills that are displayed rapidly before the human eye. A video's frame rate is a measure of how many pictures are displayed during a second of motion. The higher the frame rate, the better the quality of the clip. Lower frame rates will result in choppy video.

2. **Resolution:** Videos are made up of tiny colored dots known as pixels. The resolution of a video is expressed as a horizontal by vertical ratio (640x480, 320x240). The more pixels used to create the video's resolution, the better the image. The resolution also determines the height and width of the clip. Lower resolutions will result in smaller viewing area. This smaller viewing area is needed because it will preserve the quality of the image.

3. **Compression:** The goal of compression is to reduce the bit rate while maintaining effective image quality (Adobe, 2004). Compression algorithms, called a codec, reduce the total amount of binary code necessary to make up the digital video file. Codecs can be downloaded from the web and are often installed when different media players are installed.

For example, if an instructor uses an Apple Quick Time codec, then the student will need to have Quick Time Player installed on their machine.

Manipulation of these factors can reduce the bit rate of the video making easier to distribute on-line; however, compromising the frame rate, resolution, and compression of a clip results in a loss of quality. The instructor needs to determine how much quality loss they will accept.

Internet bandwidth is a major consideration when preparing to deliver the video clip. Bandwidth refers to the speed in which the data can be transferred to the end user's (the student) computer (<http://webopedia.com/TERM/b/bandwidth.html>). The two common types of bandwidth are low (narrow) and high (broad). Bandwidth is also measured in kilobytes per second (kbps). A student dialing into the Internet with a 56.6 kbps dial up modem receives data much slower than a student connecting using a cable modem (256 kbps). Instructors considering streaming content to students must produce videos that accommodate students who connect with a narrow bandwidth and those who use a broadband connection.

Streaming video needs to be stored on a streaming video server, however, video to be downloaded on students' computers can be stored on a normal non-streaming server. Instructors need to consult their academic computing department at this stage. Also, students need to be instructed on how and where to access their videos. Hyperlinks calling the video are generally embedded into a course Webpage, an email, or distributed during class time. Instructions are needed to assist the students with playing the video. These instructions should include what type of on-line video player is needed and where to download it, how to work the on-screen audio and video controls, and contact information if any problems occur.

The social work literature has offered little direction for the instructor wishing to use video as a facilitator of the constructivist learning process. Schoech (2002) considered using on-line video, but he believed that the distribution process would be hindered by the current Internet bandwidth. Sarnoff (2003) also touted on-line video as a method to provide content to students, but dismissed it for the similar bandwidth issue. Seabury (2003) created an on-line video where he posed as a client with presenting clinical issues. Each video was designed to provide the student with the information needed to make an assessment. For example, one video presented a suicidal client, and another video showed a client having a crisis. Prior to the video, students were given instruction on how to work with each type of client. Viewing the video gave students an opportunity to construct knowledge on working with these clients in the field. Later, when students are actually in the field, they have an opportunity to demonstrate their understanding, and if they find contradictions between the video simulation and the field experience, they are forced to renegotiate their understanding. Seabury (2003) reported that his students made positive comments about their learning experiences, but some students complained about the technical end of viewing videos on-line. For example, students did not have a fast enough home Internet connection, making the video hard to view.

In education, Murphy (2003) relied on constructivist theory to account for learning from the use of on-line video technology. To demonstrate multiple perspectives, she described an on-line environment that offered 60 short video clips organized into several categories for teaching and learning French. Murphy reported that students believed viewing multiple perspectives facilitated the learning process. Some of her students' comments

included: “It was great to learn from other people’s point of view;” “There were so many things that were brought up that I had not thought of before;” and “It [the videos] took you through different looks at the problem” (p. 9). Murphy concluded that presenting multiple perspectives through videos promoted knowledge construction by allowing the learner to “appreciate the complexity and ambiguity of the problem” (p. 11). Murphy reported that some of the negative comments about the experience were directed toward technical difficulties with viewing the video, but she did not elaborate further.

In engineering, Herder, Subrahmanian, Talukdar, Turk, and Westerberg (2002) used on-line video to contribute another viewpoint in a class. In an effort to team teach across the Atlantic, professors from the U.S. digitally recorded their lectures and saved them in a university server. During class, an instructor residing in the Netherlands would download the video for playback during class. The video was regularly paused during class so discussions could ensue. Students reported to have appreciated seeing both views. One student was quoted as saying, “Get to know different perspectives on the same subject that has been taught in class,” when asked about the strong points of using the video in class. Students seldom accessed the videos outside of class; so the authors were unable to present any information about the technical aspects. They did point out that when surveyed, students preferred clips to be short and on key issues rather than long lectures.

The lack of investigation among social work instructors may be the function of two issues. First, current research publications have not caught up with the current state of technology. Since research takes months to years for an article to reach print, the fast pace changes exist in modern technology. Secondly, only since the last half of 2003 have

consumers been able to work with digital video. In the past, human service workers had to rely on computer technicians to assist with the process (Schoech, 2002). Today, consumer editing software packages make the producing of digital video easier for the average user.

*Instructor-Selected Websites:* One way to provide varying perspectives for knowledge construction is for the instructor to isolate a select number of Web pages with various views on a topic. In this delivery model, instructors search the WWW and isolate content relevant pages. The instructor becomes responsible for providing students with the various perspectives needed in learning. This task, however, can be a difficult, because no system of checks and balances exist on the Internet compared to restrictions on publications in print. A poorly designed Website can contain valid content, while a site with vivid or dramatic video and audio can contain misinformation. In fact, anyone with proper access can disseminate content on-line. Dreyfus (1998) pointed out that at times, the quantity of the information may replace the quality on the Internet. Chu and Chan (1998) demonstrated that the Internet lacks the power to validate information. In their investigation of postings to a medically oriented discussion group, unqualified non-medical personnel posted most of the medical information and one third of the information available in the discussion group was considered unconventional by the authors, both of whom had medical degrees. Finally, from an experience with a social welfare policy class, Galambos and Neal (1998) found that the most reliable and accurate Web pages for gathering social policy information were “developed and maintained by government agencies, professional associations, non-profit organizations, policy advocate groups, think tanks, and academic settings” (p. 144).

A major disadvantage in providing a reading list for students is that the links might become broken or nonexistent over the course of a semester. Broken links are a common issue (Markwell & Brook, 2002). University instructors can use special software to capture the Website locally (i.e., save the Web pages to your desktop) and replicate the Website off the instructor's university Web server (Horton, 2000).

Few examples guide the use of a reading list. First, Varnhagen, Drake, and Finley (1997) offered students a collection of hyperlinks related to statistical resources. When queried, the students (N=14) did not use the reading list (2 on a Likert scale ranging from 1 [never used] to 5 [used every day]), but they did perceive that such a collection was somewhat useful for learning (3 on a Likert scale ranging from 1 [extremely unuseful] to 5 [extremely useful]). The authors expressed disappointment with these results and suggested that students did not recognize the potential of the collection of sites as a resource. Second, Cook and Brady (1998) provided a collection of Websites for students; however, they did not offer any feedback on the correlation between learning and providing Websites to students. Instead, their focus was on the students' ability to access the materials and their comfort level with access to the on-line material. Third, Kost and Sturman, (1999) provided content-based Websites to social work students. They asked students to submit hyperlinks for social work related sites. These linked web pages were then made available to the rest of the class. Unfortunately, the authors failed to elaborate on the success of the reading list. Finally, Faux and Black-Hughes (2000) gave students the opportunity to view a collection of Websites about the history of social work. They failed to describe their site collection, but students who were exposed to the history material through class readings and lectures performed

better on a posttest than students exposed to materials on-line (mean difference = 14.15, Post-hoc Tukey test  $F=0.03$   $p=0.02$ ).

*Search Engine:* A search engine is a Website that permits users to submit a query using keywords or concepts. The query is checked against databases, and matches are prioritized (based on some algorithm) and returned on screen to the learner (Sandell & Hayes, 2002). These matches are called hits. For example, *Time Magazine* (12/22/03) described how Google, the popular search engine, works. First, little programs are released to search and retrieve Web pages. Next, the retrieved sites are indexed and continuously updated. Third, a search query is entered and results are returned by Google's algorithm. Finally, the results are ranked and presented to the student. The one main limitation in using a search engine is that the results can produce sites that closely match the key word, but with off-topic content (Sandell & Hayes, 2002).

Literature on using search engines is limited. Few have actually written about sending students to search the Internet for a knowledge acquisition task. In fact, search engines have received little to no attention in the social work literature. A search of social work abstracts with key terms such as "search engine" and "searching the Internet" produced very few results about search engines to find academic content. One interesting investigation of search engines comes from the field of psychology. Casteel (2003) assigned groups of four to six students (eight groups in total) to explore psychological disorders on-line. Students in each group were asked to find four different Websites pertaining to a particular disorder. Students then wrote a paper using the four sites as references. Using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), Casteel found: (1) the project helped

the student understand the material (M=3.96), (2) the project required critical thinking skills (M=4.04), and (3) the project gave students computer skills usable outside of class (M=4.35).

In community settings, Natz and Schoech (2000) asked community practitioners to rate the current and future usefulness of search engines. The practitioners reported a mean usefulness score of 2 on a Likert scale ranging from 1 (not useful) to 4 (very useful). When asked for their perception of future use, the score jumped up to 2.7. While this increase seems minute, the research foreshadowed the potential for search engines. Natz and Schoech (2000) hypothesized that this change was due to the fact that as the wealth of information on-line grows, there is a greater need for a search engine.

Table 3 Advantages and Disadvantages of Delivery Techniques

| Delivery Technique           | Advantages   | Disadvantages   |
|------------------------------|--|---|
| On-line Video                | Can be created to disseminate any type of content. Video gives the student to view another person's perspective without having to be in the same room.   | Videos are labor intensive and students report technical difficulties with them.                |
| Instructor-Selected Websites | Instructors can pick and choose sites. With the wealth of information available on-line an instructor can choose diverse views of similar content. Students report that they enjoy having a list made available to them. | Sites might change or go dead over the semester.  |
| Search Engine                | Students can become exposed to a wide range of viewpoints. There are several different search engines to choose from adding to the probability the   | Search engines can return off topic hits when searching making searching sometimes frustrating. |

student will find some diverse content.

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### Conclusion

The three methods described above (reading list, search engine, and digital video) are capable of providing to the student perspectives needed in the negotiation of meaning. Table 3 outlines the advantages and disadvantages of each.

Chapter three presented background information on how several different technologies have been employed to facilitate learning. Three promising delivery methods were video clips, reading list and search engine. Chapter 4 presents the research questions and hypotheses.

## CHAPTER IV

### RESEARCH QUESTION AND HYPOTHESIS

Several interacting systems, or variables, facilitate the creation, implementation, and adaptation (by the student) when on-line video, reading list, and search engines are used to facilitate the knowledge construction process. Dean, Binder, and Coenen (1995) and Schoech (2000) identified six classifications of variables that interact in tandem. They are learner, instructor, presentation, course content, outcomes, and instructional environments. Learner and outcome variables tend to be described empirically and are the most often examined and correlated; while the other variables lend themselves to open ended, self report investigation.

Within each category several critical variables may exist. For example, variables concerned with the learner may include demographics, personality characteristics, knowledge about the content, learning styles, and reactions to how the material presented. Instructor variables that can be examined include the instructor's knowledge of the content, their own training/experience with on-line delivery techniques, and the pedagogy that drives the delivery. Presentation variables include the length of time students are required to spend on-line, technologies employed, entertainment value of the method, and the environment where the learning occurred. Course content variables include the topic being covered, learning objectives, and the skills needed to interact with the content. Outcome variables are any variable that operationalizes the end result desired by the instructor. Grades are a very common outcome measure. Lastly, instructional environment variables are identified as

those aspects of the academic institution that provides the support and structure that enables the on-line dissemination of content to run smooth and easily.

The research reviewed tended to focus on a linear relationship between learner variables and outcomes. However, such an exploration does not give an instructor a comprehensive review of the use of a technology from conception to student. A review of the limited use of digital video, reading list, and search engine indicated that their use requires a tremendous amount of time and effort. These novel technologies cannot be pre-packaged like a WebCT module. The framework presented above provides for a thorough investigation, from start to finish, of a Web delivery technique. Furthermore, by comparing the interaction between variables across web based delivery methods, instructors can learn where one technology proved more efficient than the other.

To employ one of these novel delivery techniques, knowledge of how all the parts fit together is imperative. For example, a student with a poor attitude about computers (learner variable) can not learn (outcome variable) from a digital video without careful instructions on how to download the video player and install it (presentation element). The deployment of digital video, reading list, and search engine due to their limited investigation, require a detailed analysis. By doing so, this study provides an instructor with the necessary background to make a determination about use. However, the existing research on video, reading lists, and search engines does not provide sufficient support for any directional hypotheses regarding which delivery methods to use. Therefore the framework was used to provide a detailed analysis for each technique in hopes of gathering and organizing information so that social work instructors can make informed decisions.

*Research Question:* How do the variables proposed by Dean et al. (1995) and Schoech (2000) differ across on-line video, reading list, and search engine when these delivery methods are used to facilitate the knowledge construction process?

Of particular interest to this study are those differences that can be empirically measured. For example, how do empirically measured learner variables such as attitudes and perception of the learning experience differ among the delivery techniques? Second, how would students differ on empirically measured outcomes such as quizzes or applied tasks when different techniques are employed? Third, how do the delivery techniques differ when examining presentation variables? What are the levels of satisfaction with the delivery techniques in how each organizes and presents the content? Finally, does the amount of time a student is willing to spend interacting on-line vary when on-line video, reading list, and search engine are used to facilitate knowledge construction?

Another way to explore the differences in the variables is to provide background on the delivery techniques is to examine the relationship between the variables within each delivery technique. Does what the learner bring to the on-line experience in the form of attitudes and perceptions influence the outcomes? Does the presentation of the materials and the amount of time students spend on-line also have an influence on outcomes? Investigation into the relationship among the variables provides a great deal of information about the development and deployment of each delivery technique. Furthermore, once these relationships are discovered, comparisons across delivery techniques can be conducted and further differences will emerge.

A final way to provide a thorough understanding is to discuss what is heuristically learned about the differences in the interaction of variables when on-line video, the reading list, and the search engine are used to facilitate knowledge construction. For example, what role does the instructor's knowledge about creating and using on-line delivery methods play in how they organize the content on-line? Or, what level of technical support exists at a university if sitting at a computer lab, the video a student is watching malfunctions? Ultimately, the investigation of empirically measured variables along with those that are examined heuristically offer a thorough discussion and comparison of the relationship between the variables for on-line video, the reading list, and the search engine. The limited research investigating on-line video, the reading list, and the search engine does not single out a superior technique. As indicated in table 3 in chapter 3 each delivery technique has its own unique advantages. Therefore the following hypothesis will be tested:

*Hypothesis:* Among on-line video, a reading list, or a search engine formats, student participants will have different learner variables (attitudes and perception of learning experience), outcomes (quiz scores and applied tasks), and presentation variables (satisfaction with presentation of content and time).

## CHAPTER V

### METHODOLOGY

The methodology includes the research design, sampling, the identification and measurement of the independent and dependent variables. The design and implementation of the delivery techniques and data collection are also addressed.

#### Topic of Study

The topic chosen for dissemination on-line was the principles of behaviorism. These principles included positive reinforcement, negative reinforcement, punishment, and extinction. The definitions for each of the principles appear in appendix A.

#### Research Design

The research design draws from both quantitative and qualitative methodologies. First, a pre-post design examined the change in students' knowledge from a baseline measure to their knowledge after being exposed to content through one of the three delivery techniques. The pretest scores established degree of equality of the different groups before intervention (Grinnell, 1997). Next, the post-test scores establish the level of knowledge gained as well as the ability to apply the information. Post-test scores are also used to establish the level of satisfaction with each group's delivery technique. Finally, a qualitative approach (open ended questions and self reflection) identified themes and ideas to describe the relationship between variables that can not be discussed empirically.

This study is descriptive in that it observed the phenomenon and described the situations and events related to it (Rubbin & Babbie, 1993). In general, this study aimed to describe the relationship between delivery methods and knowledge construction using the

variables outlined in chapter 4. Prior to any sampling and recruitment, this study sought and obtained approval from The University of Texas at Arlington's Institutional Review Board.

### Sampling

A convenience sampling methodology was used to recruit students for this study. Students were solicited in one of four ways. First, the study's author frequented many social work undergraduate and graduate courses at the University of Vermont (UVM) to recruit subjects. Students at UVM were offered a small incentive (\$5) to participate. Second, an email posted to The University of Texas at Arlington social work faculty listserv identified the need for subjects. Third, an email post to the Human Service Information Technology Applications (HUSITA) listserv was sent. Finally, three social work instructors (with a vested interest in technology) at different universities were solicited for student subjects. Students recruited outside of UVM were not offered a \$5 incentive, because coordinating the distribution of funds beyond UVM was not possible. A total tally of contacts for each solicitation method was not kept; therefore, the number of contacted students was unknown. The letter used for recruiting subjects can be found in appendix B.

In addition, all students willing to participate were informed of their rights as subjects. The consent form was integrated into the apparatuses of this study. At the beginning of each student's participation in the computer experience, a Web page displayed the consent letter, and each student indicated a willingness to participate. Students who were uncomfortable with participating in the study were able to close their browser and not complete the experiment. The consent form is in appendix D.

Overall, 52 subjects participated in this study: Twenty-one from UVM and 32 from outside of UVM. These 52 subjects were randomly assigned to either the reading list group, the search engine group, or the on-line video group.

### Delivery Methods

Three delivery techniques were designed to deliver content about the principles of behaviorism (positive reinforcement, negative reinforcement, punishment, and extinction). The three techniques were on-line video, reading list, and search engine.

*On-Line Video:* The analog video, entitled, *Teaching Parents How to Parent*, was converted to the digital format by using a digital video tape connected to a VCR. Scenes pertinent to the study of the principles of behaviorism were extracted using Apple's Imovie software. Imovie is a Macintosh-only product that allows users to capture, manipulate, and distribute digital videos. Four scenes were extracted, one for each of the behavioral principles. The size of each clip was roughly 240x180, while the length varied due to the subject material, however, they ranged from one minute and 40 seconds to 7 minutes and 43 seconds. Table 4 lists the movies and their lengths in order of presentation to the video students.

Table 4 The Length of Each Video

|                           | Positive<br>Reinforce-<br>ment | Punishment | Extinction | Negative<br>Reinforce-<br>ment |
|---------------------------|--------------------------------|------------|------------|--------------------------------|
| Length of Clip<br>(mm:ss) | 1:40                           | 4:19       | 7:43       | 1:47                           |

The clips were rendered as streaming video clips. A stream of 160 kps was chosen. The videos were saved as quick time movie files (.mov). Videos were then uploaded to a university run QuickTime streaming server. HTML code was used to organize the videos on individual web pages.

*Instructor-Selected Websites:* The reading list consisted of seven Websites. To compile the reading list, a search of the WWW was conducted and several sites were identified. The sites were chosen because of the diverse way the behavioral principles were presented.

Once the sites were chosen, they were captured for movement to be housed on a local university server. A program called Quadsucker for the web (<http://www.newsrobot.com/>) was utilized for capturing the Web pages. Quadsucker can be purchased on-line for a nominal fee of \$30. Quadsucker browses to a Webpage where it downloads all the files associated with the Web site.

Once the sites were captured, all extraneous content was removed (advertisements or irrelevant content) and were uploaded to this author's personal storage place provided by the University of Vermont. Hyperlinks were used to create a simple navigation system for research participants. Links to the previous and next pages were created to allow students to read the content at their own pace and return to previous pages in case the content was unclear. Overall, seven Websites were captured for the reading list and these seven sites were spread out over 13 Web pages. The first page of the reading list can be found at <http://www.uvm.edu/~aquinn/dissertation/websites/website%201/index.htm>.

*Search Engine:* A Web page was created that contained a Google search engine box. HTML code that was provided by Google was pasted into a blank page. Instructions were given so that student participants were clear on how to return to the Google search engine page when they browsed away from it while looking for web sites. The search engine page can be found at <http://www.uvm.edu/~aquinn/dissertation/group3/search.htm>.

### Variables

The variables examined in this study are organized using the categories suggested by Dean et al. (1995) and Schoech (2000).

### Learner Variables

Learner variables that were collected to examine their influence on the knowledge construction process are attitudes about the use of the Internet in education and the student's perception of the web delivery method.

Attitudes about the use of the Internet in education. Duggan, Hess, Morgan, Kim, and Wilson (2001) developed the Attitudes Towards Educational Use of The Internet (ATEUI) scale to examine student attitudes. Students' attitudes about technology were initially assessed to later determine possible interactions between attitudes and learning were investigated to determine their effect on the students' ability to interact with the three delivery methods and construct knowledge.

Perception of the learning experience. Students in each delivery group were asked to rate the satisfaction with their ability to learn about the principles of behaviorism. Specifically, "Please rate the extent you were able to form an understanding of behavioral principles." A 5-point Likert scale was used. A 5 referred to very satisfied, a 3 represented

neutral, while a 1 indicated that the student was very dissatisfied. In addition, students were given the opportunity to provide an open-ended response to explain their ranking on perceived learning.

### Outcome Variables

This study has defined two outcome variables that offer evidence of knowledge construction. They are acquired knowledge and applied knowledge.

*Acquired knowledge.* The first outcome is operationalized as the difference between pre- and posttest correct responses to multiple choice questions. Using change scores in research has been the subject of some criticism. Dimitrov and Rumrill, 2003; Willett, 1994; Rogosa and Willett, 1983; and Kissane, 1982, believed that change scores are unreliable. For example, a change score of 5 for one person might not carry the same weight as a similar change score for another person. When Subject A scored 9 out of 20 on a pretest and subject B scored 2 out of 20 on the same pretest and both improved 5 points, one cannot conclude that the increase of 5 carries the same weight for each of the subjects. Both subjects were at different places on the pretest. Kissane (1983) highlighted this point in his discussion of the measurement of change:

One of the main problems in the study of change using test scores is the lack of an interval level of measurement when test scores are used. This implies that equal numerical changes in test scores do not represent equal affective or cognitive changes in latent abilities at different levels of the continuum. (p. 55)

Particular to this study is whether a change occurred from pre- to posttest. A change from pre to post indicated that learning occurred.

*Applied knowledge.* Subjects were asked to apply the principles of behaviorism to a scenario where a young child was exhibiting biting behavior. Subjects scored a 1 (correct

response) or a 0 (incorrect response) for each principle. Three separate graders were used to tally responses. No disagreement existed among the graders.

### Presentation Variables

This study examined the amount of time students spent using the modules, perception of delivery technique, and students' opinions on what a web delivery technique should consist of.

*Time spent with delivery technique.* Operationally, time spent with delivery technique was calculated by subtracting the start time from the finished time.

*Satisfaction with the delivery technique.* Students were asked to rate their perception of the delivery technique using a 5-point Likert scale. Specifically, Please rate your level of satisfaction with the way information about behavioral principles was delivered to you. A 5 referred to very satisfied, a 3 represented neutral, while a 1 indicated that the student was very dissatisfied. In addition, students were given the opportunity to explain their satisfaction by way of an open-ended question.

*Students' opinions of how a Web delivery technique should be developed.* Students were asked an open-ended question about how they would organize an on-line session about the principles of behaviorism. What would they do differently? Perspectives about the modalities, entertainment value, and environment were captured with open-ended questions.

*Course content, instructor, and instructional variables.* Course content variables were the principles of behaviorism. The content was broken down into the five principles. The instructor variables were examined using this author's personal reflection on his knowledge about the topic, extent of training in teaching on-line course, and the pedagogy.

Finally, the instructional variables were explored by examining the facilitating role that this author's university undertook.

### Data Collection

An online survey was created which contained the pretest, the delivery technique, and the posttest. The pretest contained demographic questions, the ATEUI scale, and multiple choice questions about the principles of behaviorism. After the pretest, students were shown a page that explained the delivery technique and how to interact with it. Also on this page was a place for students to put a start and finish time. A posttest was given after interaction with the delivery technique. The posttest contained 16 multiple choice questions, three case scenarios with four open-ended questions about behavioral principles, the MMCB, and two Likert item satisfaction-based questions, and two open-ended questions about the experience with the delivery technique. The survey was estimated to take between an hour and an hour and a half.

To test the survey, a trial run was conducted. Instructors from The University of Texas at Arlington, the University of Vermont, and the University of Michigan were elicited as test subjects. Comments about the survey and delivery methods were directed to the study's author. The majority of the feedback surrounded the length of time it took to complete the study. The reviewers believed that one-and-a-half hours was too long. The reviewers believed that the MMCB was adding a significant time to the study. Furthermore, the reviewers believed that requiring students to apply knowledge to multiple case studies lengthen time students were involved in this study. In addition, one person indicated that the open-ended style of the MMCB would lead to interpretation conflicts. A final comment

indicated the need for some content revision on the way the multiple choice quiz questions were worded. No comments were given about the delivery techniques indicating the amount of web pages for the reading list, the organization and instruction for the search page, or the make-up and length of the videos.

Revisions were made based on the comments and a new survey was designed. The new survey contained a cover letter, information about the protection of human subjects, the pretest, instructions for interacting with the delivery technique, and the posttest. The pretest consisted of demographics, the ATEUI, and a 16-item multiple choice quiz. The posttest consisted of a 16 multiple choice quiz, one case study scenario that contained four open-ended response items, two Likert items rating perceived learning and satisfaction and two open-ended questions about perceived learning and satisfaction. Another trial run was conducted after the revisions were made. The average length of time to complete the study was now predicted at 30 minutes. The survey used in this study appears in appendix D.

### Procedure

All subjects were given the choice to view the Web site on either a Macintosh or IBM compatible computer and with their choice of browser (Netscape or Internet Explorer). Subjects were also requested to participate in the study in a lab environment. Allowing the study to take place in a lab controls for technical difficulties that might contaminate the knowledge acquisition process. In addition, by providing the choice of computer and browser, this experiment attempted to control for confounding factors that might arise when a person is asked to interact with a technology not all too familiar to them. Regrettably,

student-to-student interaction that might occur when putting several students in a lab was difficult to control.

The study was designed to be completely automated using various Web-based programming languages (html, JavaScript, cgi). In other words, the collection of pre- and post-survey data, identification of behavior modification principles, random assignment of students, and interactions with the Web sites took place on-line.

Students began by going to <http://www.uvm.edu/~aquinn/dissertation/>. The opening screen was a cover letter that described the study and identified the computing environment needed to complete this study. To continue, students clicked on a hyperlink which took them to a letter outlining subjects' rights. At the end of the statement, students were asked to click on a link indicating they agreed to participate. This link, when clicked, randomly assigned students to one of the three groups to begin the study: Reading List Group, Search Engine Group, and Digital Video Group. The next three pages consisted of the pretest. The pretest Web interface contained pull down menus, fill in the blanks, radio buttons (choose only one), or check boxes (to facilitate choosing more than one option). Interaction with the delivery technique followed the pretest.

The delivery page consisted of instructions for deploying the delivery method, a place for a start and finish time, and a hyperlink to start the delivery technique. Prior to starting the interaction, students were asked to record their start time. A real-time clock was embedded into the delivery page to ensure that everyone was using the same clock. To avoid the mistake of closing the survey Webpage, each delivery apparatus opened in a different browser window. When students clicked on the hyperlink to begin playing videos, a new

browser window opened. When students closed the apparatus window, they were returned to the survey page where they were asked to record their finished time. Students were sent to the posttest after they were finished. The posttest consisted of the final three pages of the survey. The posttest questionnaire contained pull down menus, essay questions, radio buttons (choose only one), or check boxes (choose more than one).

The on-line survey was created with a software program called Perseus Survey Solutions (Persues) (Perseus Development Corporation, 2001). Perseus is a “complete solution for creating and distributing surveys and collecting, analyzing, and reporting results (p. 5). Perseus works much like a word processor. The software provides formatting tools to organize any type of survey ranging from a multi item Likert scale to open-ended surveys. A created survey can be exported to HTML for distribution on the WWW. A Perseus created survey is also designed to store responses in a MySQL database. In fact, Perseus ships with a database management tool that can be used to export data as SPSS files, Excel files, and word documents.

Data was collected from September, 2003 to December, 2003. The data was stored in a database. Perseus was used to export the quantitative data to an SPSS file for empirical analysis.

### Data Analysis

The data were subjected to statistical analysis. These variables and their level of measurement appear in table 5.

A paired sample t-test examined the change between the pretest and posttest (Grinnell, 1997). An ANOVA answered the research question concerning variance.

ANOVA was used to compare group membership means when the dependent variable is a ratio/interval level of measurement. For example, an ANOVA tested to see if the mean difference scores (ratio/interval) were significantly different among the three delivery methods (nominal).  $\eta^2$  will be used to describe the effect size for the ANOVA statistic. The effect size describes the variance caused by the variables when group membership is considered. The larger the effect size the more variance explained. For example, an effect size of .11 is small while an effect size of .67 is large.

To determine the relationship between an ordinal and nominal variable, a non-parametric version of the ANOVA was utilized. This test is known as the Kruskal-Wallis test. The statistic allows for the comparison of three or more groups where the dependent variable has been ranked (i.e., an ordinal variable) (Conover, 1980). Furthermore, a Kruskal-Wallis is used in place of an ANOVA when data have abnormal distributions.

Table 5 Operational Definitions and Level of Measurement for Variables Used in this Study

| Category | Variable                              | Operational Definition   | Level of Measurement |
|----------|---------------------------------------|--|----------------------|
| Learner  | Attitudes about on-line learning      | A total scale score on the Attitudes Towards Educational Use of The Internet.  | Ordinal              |
|          | Perception of the learning experience | 5 point Likert item indicating the extent that students were satisfied that they were able to form an understanding of the principles. | Ordinal              |
| Outcome  | Acquired Knowledge                    | The difference between a posttest quiz and a pre-test quiz.  | Ratio                |

|               |                                      |   |         |
|---------------|--------------------------------------|---|---------|
|               | Applied Knowledge                    | Correct responses on an applied task.   | Ratio   |
| Pre-sentation | Time Spent with Delivery Technique   | The difference between when a student started using the delivery technique and when they finished.                    | Ratio   |
|               | Satisfaction with delivery technique | 5 point Likert item scale indicating satisfaction with the way information about behavioral principles was delivered. | Ordinal |

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A chi-square test examined the association between two nominal variables in this study. A chi-square examines the extent to which frequencies that were observed compare to what was expected to occur if the distribution of the frequencies was distributed by chance (Rubin & Babbie, 1993). A chi-square can be ineffective at describing a relationship when observed or expected cell frequencies are low. For the chi-square measure, the effect size, Cramer's V, will be calculated.

A Pearson Product Moment Correlation described the relationship between interval and ratio variables. The non-parametric correlation statistic, Spearman's Rho, was used when the comparison was between nominal and nominal, ordinal and ordinal, and (in some cases) nominal and ordinal. The Spearman's Rho uses ranks and examines the relationship between the rank orders of two variables (Conover, 1980). The statistic, called a correlation coefficient, produced by the measure of correlation describes the strength of the linear relationship between two variables. Table 6 identifies the conventions used for identifying the strength of correlation coefficients (Gerstman, 2003). The one drawback to the correlation statistic is that with a small sample size correlations are subjected a large sampling error. A large sampling error makes it difficult to generalize correlation findings beyond the sample of subjects.

Table 6 Caliber of Strength of Correlation  
Statistics Used in this Study

| Correlation             | Strength |
|-------------------------|----------|
| $0 \leq X \leq 0.3$     | Weak     |
| $0.31 \leq X \leq 0.7$  | Medium   |
| $0.71 \leq X \leq 1.00$ | Strong   |

Finally, graphs, frequency tables, and cross tabs were used to describe the data. Chapter 5 explained the methodology and statistical approach to analyze. Chapter 6 presents the results.

## CHAPTER VI

### RESULTS

The results are presented as follows:

1. Demographics for overall sample and the individual groups.
2. A description of the variables for each delivery method.
3. Assessment of the strength of the relationship among the variables for each delivery method.
4. A content analysis of the participant's open-ended responses.

#### Demographics

Fifty-two students participated in this study. The 52 subjects were randomly assigned to one of the three delivery techniques (see table 7). Overall, 50 females and two males participated. Out of the 52 subjects, only one student was not a social work major. Within the 51 social work majors, 46 were studying direct practice, while six of them were studying social work administrative. The age of the participants ranged from 18 to 61.

Table 7 Number of Students in Each Group

|   | Delivery Method |              |               |
|---|-----------------|--------------|---------------|
|   | Video           | Reading List | Search Engine |
| N | 14              | 19           | 19            |

#### Analysis of Variables by Overall Sample and Group

In the following section group variables were described and the hypothesis assessed.

#### Learner Variables

Learner variables were attitudes about the use of the Internet in education and students satisfaction with how they learned.

Attitudes about On-line Learning.

Attitudes were measured using the Likert item scale, ATEUI. The scale scores were summed, forming a ratio variable of attitudes. The possible range for this scale was from 18-90, with the higher scores indicating more comfortable attitudes toward educational use of the Internet. Four cases were not computed because of missing data. The Cronbach's alpha

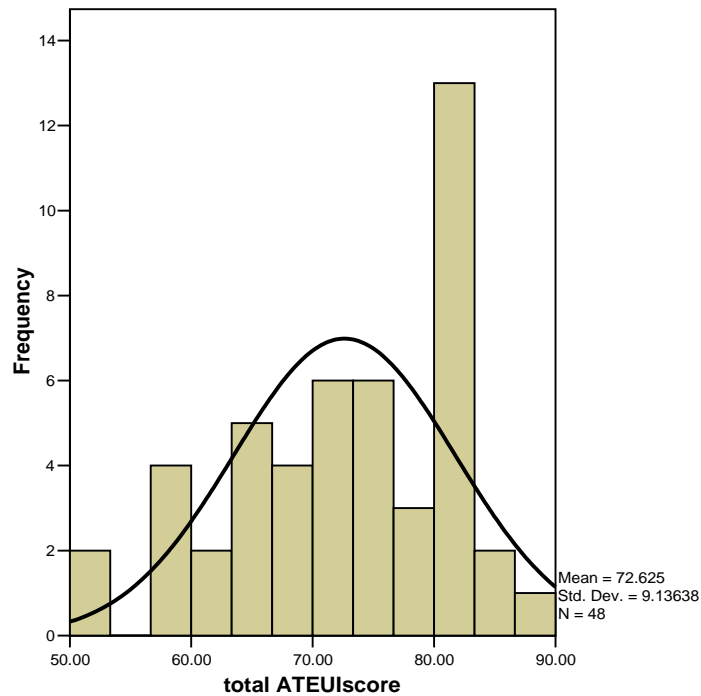


Figure 1 Range of attitudes for overall sample

of 0.83 was calculated for the 52 respondents' ATEUI scores. Overall, the attitude scores for this study ranged from 53 to 88, with the overall mean of 72.63 and a standard deviation of

9.14. Figure 1 presents a histogram depicting the range of attitude scores for the overall sample.

The means and standard deviations of attitudes for the three groups are presented in table 8.

Table 8 Means and Standard Deviations for Attitudes

|                    | Group         |              |               |
|--------------------|---------------|--------------|---------------|
|                    | On-line Video | Reading List | Search Engine |
| Mean               | 76.54         | 72.06        | 70.24         |
| Standard Deviation | 7.28          | 9.08         | 9.95          |

An examination of the means shows that students in all three groups had similar positive attitudes. A check of the skewness (-0.45) and kurtosis (-0.68) determined that attitudes had a normal distribution. An ANOVA found no significant differences between the three group means on the ATEUI ( $F(2, 45)=1.877, p=0.17$ ). The effect size (0.08) indicated that the proportion of variance in attitudes explained by group membership was non-existent.

Perception of the Learning Experience

Students' satisfaction with how they learned was measured using a 5-point Likert scale ranging from very satisfied to very dissatisfied. Table 9 presents the frequencies for each response by group participation. More than half of the students for each group reported satisfactory perceptions of the Web delivery technique as a facilitator of knowledge

Table 9 Frequency of Responses for Perceived Learning

| Reported Satisfaction | Frequency | On-line | Reading List | Search Engine |
|-----------------------|-----------|---------|--------------|---------------|
|-----------------------|-----------|---------|--------------|---------------|

|                       | Video (n=14) |    | (n=19) |    | (n=19) |    |    |    |
|-----------------------|--------------|----|--------|----|--------|----|----|----|
|                       |              | %  | %      | %  | %      | %  |    |    |
| Very Satisfied        | 13           | 25 | 5      | 36 | 5      | 26 | 3  | 16 |
| Somewhat Satisfied    | 21           | 40 | 3      | 21 | 8      | 41 | 10 | 52 |
| Neutral               | 5            | 10 | 1      | 8  | 2      | 11 | 2  | 11 |
| Somewhat Dissatisfied | 6            | 12 | 2      | 14 | 2      | 11 | 2  | 11 |
| Very dissatisfied     | 7            | 13 | 3      | 21 | 2      | 11 | 2  | 11 |

construction which suggests that students are comfortable learning from any of the three techniques.

Since students' satisfaction with how they learned was an ordinal variable and group was a nominal variable, a Kruskal-Wallis test was used to examine differences in the ranks. Table 10 presents the mean ranks for each of the groups.

Table 10 Mean Ranks for Perception of the Learning Experience

|           | Group                   |                        |                         |
|-----------|-------------------------|------------------------|-------------------------|
|           | On-line Video<br>(n=14) | Reading List<br>(n=19) | Search Engine<br>(n=19) |
| Mean Rank | 26.41                   | 27.53                  | 25.74                   |

The Kruskal-Wallis test produced a chi-square numeric of 0.18, which was not statistically significant at the p=0.05 level. The effect size (0.82) indicated that the proportion of variance in participants' perceptions explained by group membership was substantial. No significant findings existed among the groups and the three outcomes. This finding suggests that students similarly perceived their ability to learn within all three techniques.

#### Outcome Variables

The outcome variables that were examined empirically were acquired knowledge and applied knowledge.

Acquired Knowledge

Students initially took a 16-item multiple-choice pre-test intended to determine their baseline knowledge of the principles of behaviorism. The pretest had a mean of 7.25 and a standard deviation of 2.21 with a spread of 2-13. Table 11 lists the pretest means by group.

Table 11 Pretest Mean by Group

|               | Group                   |                        |                         |
|---------------|-------------------------|------------------------|-------------------------|
|               | On-line Video<br>(n=14) | Reading List<br>(n=19) | Search Engine<br>(n=19) |
| Pretest Means | 7.07 (SD=2.92)          | 7.89 (SD=3.06)         | 6.74 (SD=1.70)          |

A check of skewness (-0.12) and kurtosis (0.12) indicated that the pretest scores had a normal distribution. An ANOVA of the pretest means found no difference between group participation ( $F(2, 49)=1.38, p=0.26$ ). The effect size indicated that the proportion of variance in the pretest scores explained by group membership was nonexistent.

Table 12 Posttest Mean by Group

|                | Group                   |                        |                         |
|----------------|-------------------------|------------------------|-------------------------|
|                | On-line Video<br>(n=14) | Reading List<br>(n=19) | Search Engine<br>(n=19) |
| Posttest Means | 11.57 (SD=3.06)         | 10.84 (SD=2.12)        | 10.89 (SD=3.65)         |

After the delivery method, students completed a posttest. The posttest scores ranged from 4 to 16 with an overall mean of 11.06, and a standard deviation 2.96 (see table 12). A check of skewness (-0.47) and kurtosis (-0.36) indicated that the posttest scores had a normal distribution. An ANOVA found no significant difference between the groups in their posttest scores, ( $F(2, 49) = 0.28, p = 0.76$ ). The effect size (0.11) indicated that the proportion of variance in the posttest score that was explained by group membership was minimal.

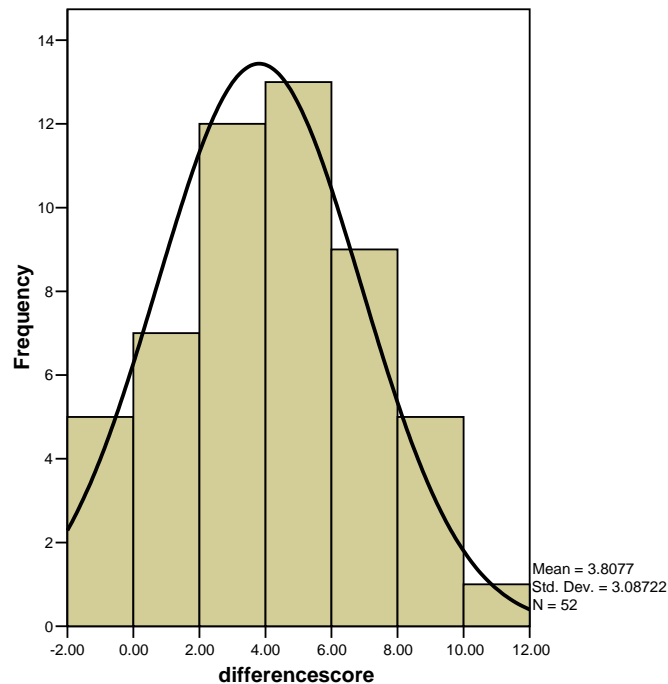


Figure 2 Distribution of difference scores for sample (n=52)

A t-test assessed the pre-posttest change scores. The change scores were calculated by subtracting each person's posttest score from the pretest score. The change scores had a mean of 3.8 and a standard deviation of 3.09. The range of data is depicted in figure 2. A

significant difference in the means of the change scores indicated that individual participants changed in their knowledge level at a statistically significant level ( $t = 8.89$ ;  $p=0.001$ ).

Each of the groups demonstrated a significant change (see table 13). A check of skewness (-0.08) and kurtosis (-0.41) indicated that the difference scores had a normal distribution. An ANOVA assessed the change scores between the three groups. No difference in change score means existed between the groups of participants ( $F(2, 49)=1.22$ ,  $p=0.30$ ). The effect size (0.05) indicated that the proportion of variance in the difference scores explained by group membership was nonexistent. The lack of a significant finding between groups prohibits identifying one delivery technique as a significantly better facilitator of knowledge acquisition.

Table 13 Mean Difference Scores by Group

|                   | Group                        |                              |                              |
|-------------------|------------------------------|------------------------------|------------------------------|
|                   | On-line Video (n=14)         | Reading List (n=19)          | Search Engine (n=19)         |
| Difference Scores | 4.16 ( $t=5.54$ , $p=0.00$ ) | 2.95 ( $t=6.38$ , $p=0.00$ ) | 4.50 ( $t=4.32$ , $p=0.00$ ) |

### Applied Learning

Students were asked to answer open-ended questions that indicated their abilities to use the principles of behaviorism in an applied setting. Correct answers were given the score 1 while incorrect answers were scored with a zero. The possible spread of scores was 0 to 4. Table 14 shows the means by group for the applied knowledge variable. The reading list had the lowest mean number of correct responses (1.93), while the students in the reading list

(2.53) and the search engine (2.42) groups performed comparably. A check of the skewness (-0.61) and kurtosis (0.94) indicated that the range of correct answers was normally

Table 14 Mean Number of Correct Responses for Applied Knowledge Variable

|  | Group                   |                        |                         |
|--|-------------------------|------------------------|-------------------------|
|  | On-line Video<br>(n=14) | Reading List<br>(n=19) | Search Engine<br>(n=19) |
| Mean # of correct responses<br>for applied knowledge | 1.93                    | 2.53                   | 2.42                    |

distributed across the groups. An ANOVA indicated a significant difference among the groups on the applied task ( $F(2, 49)=3.17, p=0.05$ ). The effect size (.12) indicated that the proportion of variance in applied knowledge explained by group membership was minimal. A post-hoc test demonstrated that the video group differed significantly in its variance from the other two groups (Tukey HSD,  $p=0.05$ ).

#### Presentation Variables

Time spent on-line and satisfaction with the delivery method was examined empirically.

#### Time Spent with Delivery Technique

Data on time spent with delivery methods was also recorded. Students were asked to record their start and finish time. Two cases were not computed because of missing data. Overall, students spent an average of 17.8 minutes ( $SD=15.34$  minutes) on-line for this experiment. The median for time indicated that half ( $n=26$ ) spent less than 14.19 minutes

interacting with the apparatuses. Figure 3 presents a histogram depicting the range of time spent for the overall population.

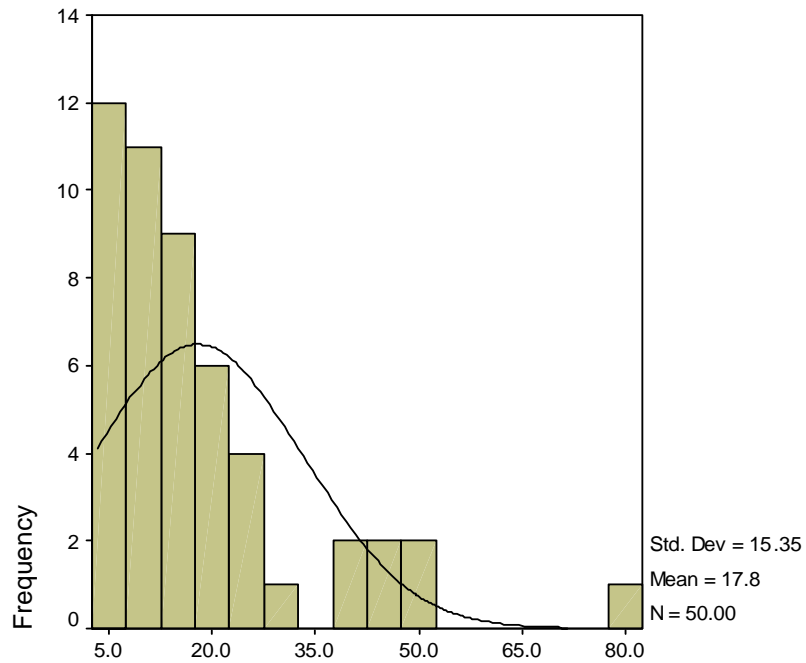


Figure 3 Distribution of time spent for all participants (n=52)

The mean times spent with delivery methods and standard deviations and the median are delineated by group in table 15.

Table 15 Mean, Standard Deviation, and Median for Time

|                        | Group                   |                        |                         |
|------------------------|-------------------------|------------------------|-------------------------|
|                        | On-line Video<br>(n=14) | Reading List<br>(n=19) | Search Engine<br>(n=19) |
| Mean (time in minutes) | 19.35                   | 22.05                  | 12.68                   |
| Standard Deviation     | 21.32                   | 14.02                  | 10.89                   |

|        |       |       |      |
|--------|-------|-------|------|
| Median | 13.10 | 18.00 | 9.00 |
|--------|-------|-------|------|

The skewness (1.91) and the kurtosis (4.17) indicated that time was not normally distributed. Therefore, a Kruskal-Wallis test examined the differences in the ranks between the three groups. Table 16 presents the mean ranks by group.

Table 16 Mean Ranks by Group for Time Spent

|           | Group                   |                        |                         |
|-----------|-------------------------|------------------------|-------------------------|
|           | On-line Video<br>(n=12) | Reading List<br>(n=19) | Search Engine<br>(n=19) |
| Mean Rank | 24.42                   | 32.45                  | 19.24                   |

A chi square statistic described the association between time and group membership. The chi square (7.91) was significant at  $p=0.02$ . The effect size (0.56) indicated that the proportion of variance in time explained by group membership was moderate. A Mann-Whitney non-parametric test indicated that the time the reading list and the search engine spent constructing knowledge were significantly different from each other ( $p=0.01$ ), while the video group did not significantly differ from either group. Due to this finding, the presentation variable of time required a closer look.

First, in the on-line video group, the range extended from three minutes to 78 minutes. However, the cumulative time to watch the videos was 15 minutes, 19 seconds. An examination of the median of on-line video (13 minutes, 10 seconds) demonstrated that seven students spent less time watching the videos than the actual length of the video. The finding

could also indicate that students quickly watched until they got an answer and moved to the next video. Table 17 identifies the frequency of the amount of time spent for on-line video.

Table 17 Frequency for Time Spent in On-line Video

| Time in mm:ss (n=12) | Frequency |
|----------------------|-----------|
| 3:00                 | 1         |
| 4:00                 | 1         |
| 8:00                 | 2         |
| 10:00                | 1         |
| 11:18                | 1         |
| 15:00                | 1         |
| 16:00                | 1         |
| 17:00                | 1         |
| 18:00                | 1         |
| 44:00                | 1         |
| 78:00                | 1         |

Table 18 Frequency for Time Spent in Reading List Group

| Time in mm:ss (n=12) | Frequency |
|----------------------|-----------|
| 5:00                 | 1         |
| 7:00                 | 1         |
| 9:00                 | 1         |
| 10:00                | 1         |
| 12:00                | 1         |
| 13:00                | 1         |
| 16:42                | 1         |
| 17:00                | 1         |
| 18:00                | 2         |
| 19:00                | 2         |
| 25:00                | 1         |
| 26:33                | 1         |
| 27:00                | 1         |
| 28:00                | 1         |
| 46:00                | 1         |
| 51:00                | 1         |
| 52:27                | 1         |

The reading list group also has a range worth investigating. The minimum time was five minutes to read 13 Web pages. The frequencies indicated that six people spent the average of a minute or less reading each page. However, the high median for the reading list group could be an indication that some participants were immersed in the content. Table 18 provides the frequencies for time spent in reading list group.

Search engine had similar results with 5 people spending five minutes or less searching the Internet. Search engine also had the lowest median. More than half (n=11) spent less than 9 minutes using a search engine and examining the websites generated by the search engine. The results suggest that these students were quickly searching for answers, rather than taking time to carefully digest the content. Finally, the frequencies for time spent reading pages using the search engine are listed in table 19. Each of the groups had extreme scores. However, student behaviors were not tracked. For example, students were not asked to record how many times they watched the video, or how long they read or searched. For the variable of time, extreme scores were noted but not dropped.

Table 19 Frequency for Time Spent in Search Engine

| Time Spent in mm:ss for Search Engine (n= 19) | Frequency |
|---|-----------|
| 3:00  | 1         |
| 3:22  | 1         |
| 3:27  | 1         |
| 5:00  | 2         |
| 6:00  | 1         |
| 7:00  | 2         |
| 8:00  | 1         |
| 9:00  | 2         |

|       |   |
|-------|---|
| 12:00 | 1 |
| 11:37 | 1 |
| 15:00 | 2 |
| 18:00 | 1 |
| 23:00 | 1 |
| 39:00 | 1 |
| 40:00 | 1 |

Satisfaction with Delivery Technique

Students were asked to indicate their level of satisfaction with delivery method. Satisfaction was ranked using a 5-item Likert scale. Table 20 provides the frequency counts for the satisfaction variable.

Table 20 Frequency Counts of Student Responses for Satisfaction with Delivery Method

| Reported Satisfaction | Total Frequency |    | Group 1 (Video) n=14 |    | Group 2 (Reading List) n=19 |    | Group 3 (Search Engine) n=19 |    |
|-----------------------|-----------------|----|----------------------|----|-----------------------------|----|------------------------------|----|
|                       |                 | %  |                      | %  |                             | %  |                              | %  |
| Very Satisfied        | 14              | 27 | 3                    | 21 | 6                           | 32 | 5                            | 26 |
| Somewhat Satisfied    | 21              | 40 | 6                    | 44 | 9                           | 46 | 6                            | 31 |
| Neutral               | 5               | 10 | 1                    | 7  | 2                           | 11 | 2                            | 11 |
| Somewhat Dissatisfied | 5               | 10 | 1                    | 7  | 0                           | 0  | 4                            | 21 |
| Very dissatisfied     | 7               | 13 | 3                    | 21 | 2                           | 11 | 2                            | 11 |

More than half of the students (n=35, 67%) reported that they were somewhat to very satisfied with their delivery method, suggesting that, in general, students responded to the delivery methods. Also the mode for all three groups was somewhat satisfied. The pattern indicated that while students appeared to be satisfied, they apparently had some concerns with the deployment of the delivery techniques.

Table 21 Mean Ranks for Satisfaction by Group

|           | Group            |                         |                          |
|-----------|------------------|-------------------------|--------------------------|
|           | Group 1<br>Video | Group 2<br>Reading List | Group 3<br>Search Engine |
| Mean Rank | 24.39            | 29.63                   | 24.92                    |

A Kruskal-Wallis test assessed differences in the ranks between the three groups. Table 21 presents the mean ranks by group. A chi square statistic described the association between satisfaction and group membership. The chi square (1.41) was not significant. The effect size (0.60) indicated that the variance in satisfaction explained by group membership was substantial.

The Relationship between the Variables

The following correlations describe the relationship of variables within the groups. Due to the low sample size and large sampling error, group comparisons maybe misleading if not impossible to assess.

Table 22 The Correlation between Learner and Presentation Variables on the Outcomes for Each Group

|                                  |                    | Group 1<br>Video<br>n=14 | Group 2<br>Reading<br>List<br>n=19 | Group 3<br>Search<br>Engines<br>n=19 |
|----------------------------------|--------------------|--------------------------|------------------------------------|--------------------------------------|
| <b>Learner Variables</b>         |                    |                          |                                    |                                      |
| Attitudes about on-line learning | Acquired Knowledge | 0.34                     | -0.32                              | 0.37                                 |
|                                  | Applied Knowledge  | 0.05                     | -0.06                              | 0.16                                 |

|                                       |                    |       |       |       |
|---------------------------------------|--------------------|-------|-------|-------|
| Perception of the learning experience | Acquired Knowledge | -0.23 | 0.12  | 0.24  |
|                                       | Applied Knowledge  | -0.08 | -0.02 | 0.25  |
| <hr/>                                 |                    |       |       |       |
| Presentation Variables                |                    |       |       |       |
| <hr/>                                 |                    |       |       |       |
| Time spent with delivery technique    | Acquired knowledge | 0.30  | 0.18  | -0.51 |
|                                       | Applied Knowledge  | -0.25 | -0.28 | 0.06  |
| Satisfaction with delivery technique  | Acquired Knowledge | -0.07 | 0.16  | 0.33  |
|                                       | Applied Knowledge  | -0.09 | 0.00  | 0.13  |

First, table 22 describes the strength of the relationship between the outcome variables and the learner and presentation variables. In table 22, for example, the 0.34 for the video group is a measure of the relationship between attitudes and acquired knowledge.

#### Current Attitudes about Technology

Students attitudes about educational uses of the Internet had a moderate effect on the demonstration of acquired knowledge for all three groups. However, the reading list had a negative correlation (-0.32). Therefore, for students in the reading group, students with poorer attitudes toward on-line education had better difference scores than students who had good attitudes. On the other hand, in all three groups, attitudes had little or no association for how students applied their constructed understandings.

#### Perception of the Learning Experience

Students' perception of the learning experience was weakly correlated with their acquired knowledge (-0.23, 0.12, and 0.24). Students demonstrate very limited association between their perception of their understanding and their learning of the material. Weak

correlations between applied knowledge and how students perceived their understanding of the material also existed (see table 22).

### Time Spent with Delivery Method

The time spent with the delivery method was moderately correlated with the acquired knowledge variable for the video (0.30) and search engine group (0.51). The moderate influence for the video group suggested that the longer students spent watching the videos the better the difference score. The negative correlation suggests that the less time spent searching, the better the students performed on the acquired knowledge variable. The reading list had a weak correlation (0.18) which suggests that the time the students spent reading websites did not influence their ability to construct knowledge.

In the area of applied knowledge, all three groups had weak correlations between the time and how they did on an applied task (see table 22). How students applied their constructed knowledge about the principles did not depend on the time they spent engaged in the apparatuses. Interestingly, as suggested by the negative correlations for the video group (-0.25) and the reading list (-0.28), the more time students spent constructing knowledge, the less successful the students were when applying a constructed understanding.

### Satisfaction with Delivery Methods

The search engine group had the only moderate correlation between satisfaction and acquired knowledge (0.33). The more satisfied the students were, the better their difference score (4.16). The three groups all had weak correlations with applied knowledge and satisfaction.

### Relationship between Learner and Presentation Variables

Table 23 describes the correlations between and among learner and presentation variables.

Attitudes were moderately correlated with time spent with delivery technique. A negative correlation existed between attitude and time spent with delivery technique for the reading list (-0.35) and the search engine (-0.42) groups. The greater the students' attitudes the less time they spent on-line constructing knowledge. Attitudes also had a moderate relationship with how students perceived their learning experience for the video group (0.54) and the reading list (0.56). The perception of the learning experience was greater if students had good attitudes about using the Internet in education. The search engine group had a

Table 23 Strength of Relationships between Learner and Presentation Variables in the Three Groups

|  |  | Group 1<br>Video<br>n=14 | Group 2<br>Reading<br>List<br>n=19 | Group 3<br>Search<br>Engines<br>n=19 |
|--|--|--------------------------|------------------------------------|--------------------------------------|
| <b>Relationship between Learner and Presentation Variables</b> |  |                          |                                    |                                      |
| Attitudes about the use of the Internet in education           | Time spent with delivery technique       | 0.48                     | -0.35                              | -0.42                                |
|  | Satisfaction with delivery technique     | <b>0.47</b>              | <b>0.64</b>                        | <b>0.42</b>                          |
| Perception of the learning experience                          | Time Spent with Delivery Technique       | 0.06                     | -0.18                              | 0.21                                 |
|  | Satisfaction with the delivery technique | <b>0.16</b>              | <b>0.75</b>                        | <b>0.70</b>                          |
| <b>Relationship among the Learner Variables</b>                |  |                          |                                    |                                      |
| Attitudes about the  | Perception of the                        | <b>0.54</b>              | <b>0.56</b>                        | <b>0.27</b>                          |

|  |                                    |      |      |      |
|--|------------------------------------|------|------|------|
| use of the Internet in learning experience education |                                    |      |      |      |
| Relationship among the presentation variables        |                                    |      |      |      |
| Satisfaction with the delivery technique             | Time Spent with Delivery Technique | 0.16 | 0.11 | 0.21 |

Bold Type indicates a Spearman Rho Correlation

weak correlation (0.27), suggesting that their perception of their knowledge construction was relatively unrelated to their attitudes.

A strong correlation existed in how students perceived the learning experience and their satisfaction with the reading list (0.75) and the search engine (0.70) delivery techniques. The higher the students' satisfaction with how they perceived their learning experience, the more satisfied they were with the technology. Interestingly, video had a weak correlation between perception of the learning experience and satisfaction with delivery techniques (0.16). The weak relationship indicated that how the students perceived what they learned from the video was unrelated to how satisfied they were with the presentation of the video.

The amount of time students spent constructing knowledge was weakly correlated with the perception of the learning experience (see table 23). The time students spent constructing knowledge did not play a part in how they perceived their ability to construct an understanding of the behavioral principles. The amount of time spent constructing knowledge was weakly correlated with the satisfaction with the video group (0.16), the reading list (0.11), and the search engine (0.21). The amount of time the student spent constructing knowledge had little to do with how satisfied the students were with the delivery technique.

### Content Analysis

Students were asked to provide responses to open ended questions to three questions. First, students were asked to explain their Likert-item response to the learner variable of perception with the learning experience. The responses described three themes: Positive attitudes toward the delivery technique to facilitate the learning experience, limited ability to facilitate learning, and their tendency to confuse students' understanding of the principles (see table 24).

Table 24 Results from Content Analysis

| Theme/Method                     | Comment   |
|----------------------------------|---|
| Facilitated the learning process |   |
| Video                            | <p>I really understood the concepts through the use of the videos, especially with the PowerPoint and the examples used</p> <p>I have appreciated the use of videos when I receive an example</p>   |
| Reading list                     | <p>Websites offer information for laymen or experts depending on the type and level of information the viewer is intending to find.</p> <p>The examples were easy to follow and did a good job illustrating the concept</p>   |
| Search Engine                    | <p>Well, I joined the practical knowledge with the theoretical knowledge found on the website</p> <p>There was one website I found of an experiment for students, where in the beginning it gave different examples of what positive reinforcement was</p> <p>An understanding of behavioral principles was gained quickly over the internet by clicking on just a few of the sites</p> <p>A website that I found utilized some graphs which are helpful to me since I am an auditory learner. By using the graphs I could look at the four different principles at the same time to help me remember</p> |

which was which.

I found some good definitions

I found an excellent website that had descriptions of each term, so i was able to learn the terms in a matter of a few minutes and not a lot of web browsing

#### Confusion

Video I'm still a little confused about extinction and neg. reinforcement

#### Table 24—*Continued.*

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Reading list I think it is a little confusing especially since there are a couple of ways to look at different situations. I don't have a clear idea how correct my answers are

Different terms on different sites and different definitions made it hard.

Search Engine Some of the research was too complicated to understand

#### Limiting

Video The message was delivered, but one cannot ask questions. There should have been downloadable handouts.

I was not able to really access the videos.

I didn't get to view them properly

There should have been downloadable handouts.

Reading List It became very repetitive and I was bored and began to fade and was unable to absorb the information fully

The websites were not enticing

Search Engine I found a website about these different behaviors. It only gave a little bit of information though

I understood positive reinforcement, punishment, and extinction-but had questions about negative reinforcement, and could not ask anyone these questions

I need to read more examples of each behavioral principle; I am still

a little unclear on EXTINCTION. The web text gave me definitions, but not specific examples.

I understood some of them [principles] but not all

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Next, students were asked to explain their Likert item response to the presentation variable of satisfaction of the delivery method. First, responses described positive and negative aspects about using the delivery methods (see table 25).

Table 25 Results from Content Analysis

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| Theme/Method                    | Comment  |
|---------------------------------|--|
| Positive Comments on Usefulness |  |
| Video                           | <p>Videos were very good</p> <p>The videos made things clear</p> <p>The videos were helpful</p> <p>I find videos helpful as usually I am able to see examples of the principles</p> <p>I would be fairly satisfied with using videos to deliver course content as long as I had the ability to review the videos again if needed</p>                                       |
| Reading List                    | <p>Comfortable skimming the material to look for the specific subject areas</p> <p>Lots of relevant information</p> <p>They [reading list] were informative and concise</p> <p>Websites have the ability to offer written descriptions and pictures to help the viewer understand the concepts. Websites also offer links to other websites for even more information.</p> |

|               |   |
|---------------|---|
| Search Engine | <p>I found clarification I needed for punishment and negative reinforcement</p> <p>With one search you received many websites for information on your topic. Each site gives you other links to the information and the search can be endless</p> <p>I found adequate information this survey</p> <p>I found a website that was very efficient in explaining the differences between negative reinforcement and punishment</p> <p>Without the other keywords suggested in the study I may not have found the information I needed, especially on extinction</p> |
|---------------|---|

Table 25—*Continued.*

---

|   |  |
|---|--|
| <p>Negative<br/>Comments about<br/>Usefulness</p> |  |
| Reading List                                      | I like researching some topics, but other not so much.   |
| Search Engine                                     | <p>Some websites on these topics were better than others</p> <p>If I was using a textbook I could read exactly what I was looking for, with a web page however you sometimes need to look more into the information to find the answers to what you are ACTUALLY looking for</p> <p>I just don't like sitting at computers, I would rather read a book</p> <p>Because I was not sure of the correct terms, it was a little difficult finding exact information</p> |

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Second, the responses described the presentation of the content (see table 26).

Table 26 Results from Content Analysis

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Theme/Method

| Presentation of Content | Comment   |
|-------------------------|---|
| Video                   | Shorter videos were better<br><br>They [Video] were extremely boring and I would skip to the next one because it was a lecturer<br><br>The image was there but it was blurred and distorted |
| Reading List            | Too much information<br><br>Some [web pages] were too technical and they were very unorganized when reviewed as an entire group   |

Finally, students were asked to provide their own perspective on how to organize a session on on-line sessions. Unlike the students' responses described in tables 24, 25, and 26, their responses suggested specific changes in length of presentations, use of alternative delivery methods, the use of more bells and whistles, and more accessible content (see table 27).

Table 27 Results from Content Analysis

| Theme/Method           | Comment   |
|------------------------|---|
| Length of Presentation |   |
| Video                  | Some shorter sessions<br><br>I think keeping things short is definitely a good thing<br><br>The one video was way too long [extinction] maybe   |
| Reading List           | Maybe less information<br><br>Not give out too much information all at once<br><br>Not repeat as much information and have it be on fewer pages |

|                                  |  |
|----------------------------------|--|
|                                  | A simple chart would have been sufficient  |
|                                  | Bullet the concepts—No long explanations   |
| Alternate Delivery Methods       |  |
| Video                            | Audio clips or even just written narrative   |
|                                  | The PowerPoint handouts could have been delivered via downloads prior to the film being shown  |
|                                  | I would use PowerPoint slides instead of videos  |
| Search Engines                   | I would have provided specific site to check   |
|                                  | I would include a video that would illustrate the different ways one could apply the principles in reality   |
| <hr/> <i>Table 27—Continued.</i> |  |
|                                  | I would of have had the websites already bookmarked or on a webpage of its own   |
|                                  | I would look up the websites ahead of time and provide the students with helpful websites to use   |
|                                  | I would have probably had a question and answer section, or more examples of negative reinforcement. Possibly an online chat room, for people to ask questions about these principles. |
|                                  | I would of provided the two websites that I felt were most useful  |
|                                  | I would have presented more information about the principles, including more examples  |
|                                  | I would have examples of scenarios after each definition to clarify which type of behaviorism was being used   |
| Bells and Whistles               |  |
| Video                            | Some interactive exercise as the person goes through the on-line training  |

|                    |  |
|--------------------|--|
|                    | Use more illustrations   |
|                    | Use skits, movie clips, music, something to grab the attention of the viewers better                           |
| Reading List       | Add sound and motion to the slide  |
|                    | Engage the viewer with a game, a puzzle, etc. that teaches the principles while keeping the viewer's attention |
|                    | More bells and whistles. Something graphic and sparkly   |
|                    | A simple chart would have been sufficient  |
| Accessible content |  |
| Reading List       | Make the websites more concise and strength to the point   |
|                    | Lump all related subjects together. All positive reinforcement first, then negative etc                        |

Table 27—Continued.

---

|               |  |
|---------------|--|
| Search Engine | Give more advice on how to find information  |
|               | Stress the importance of using specific search terms   |
|               | Make sure that each word or behavior was defined in advance so that an understanding of what the behavior meant happened before hand |
|               | I think it is very important to have the subject headings appropriately labeled for people to find out more information              |

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Chapter 6 presented the empirical results from this study. Chapter 7 elaborates on the data to highlight and discuss the advantages and disadvantages for using on-line video, a reading list, and the search engine.

## CHAPTER VII

### DISCUSSION

The empirical results coupled with the open-ended responses documented the strengths and drawbacks with using each delivery technique. Due to the small sample sizes for each technique, between group comparisons can not be conducted.

#### On-line Video

Video was perceived as providing a satisfactory learning experience; however a few students reported that the video limited or confused their understanding of the principles. For the most part, students reported being satisfied with their perceived learning (n=8, 57%). Secondly, students reported being satisfied with the delivery method (n=9, 65%). Third, students found the videos useful. For example, one student commented that the videos were useful because she could view them as many times as she wanted. Other students commented on how clear the videos made things. For example, "I find videos helpful as usually I am able to see examples of the principles." However, when asked, about their perceptions of learning one student responded that the videos limited the ability to learn. For example, one student said "the message was delivered, but one cannot ask questions."

*Length of Videos is an Important Consideration:* At least half of the students (n=7) did not watch all the videos. The total time needed to watch all five video clips was 15 minutes and 19 seconds. More than half of the video group recorded less time than needed to view all the videos as indicated by the median time of (13 minutes and 10 seconds). The fact that students did not spend time watching all the videos might suggest that the video clips should be short. On the other hand, these students may have wanted to gain the definition of

the behavioral principles and not wait for the video's details or examples. Support for this assertion may be seen in the low scores of the applied knowledge variable. The applied knowledge mean was 1.93 (out of 4). Students most likely stopped the videos and failed to see the applied examples at the end of each clip.

*Need to Control for Technical Difficulties:* Two of the students reported technical difficulties on their machines while trying to view the videos. These two students participated in the study off campus; therefore, their equipment was not monitored. Each student reported that the computer they were using was old and the video was blurred. Both also reported that they were very dissatisfied with their perceived learning and their overall satisfaction. Also, one UVM student came to the computer lab where the researcher was employed. The machine she used did not have the proper version of QuickTime installed. To remedy the situation, the computer would have needed to be rebooted. A reboot would have disrupted the progress of the study, therefore the student agreed to return at a later date. The student was able to return later and restart the experiment. The ability to deliver on-line content with minimal technical difficulties is a must!

*Need to Control for Varying Attitudes:* Attitudes had moderate influence on students' acquired knowledge, perception of learning, time spent, and satisfaction with the delivery techniques. One possible way to encourage students with varying degrees of satisfaction with on-line video is to do a preview in a university lab. For example, students can meet in a university lab, where they can learn how to interact with the delivery method. Technical staff can answer any questions. By providing a hands-on demonstration, instructors and technical staff can work with the students until they are comfortable with using on-line

videos to construct knowledge. Also, students could bring their personal laptops to the lab. Lab technicians would be able to resolve or address any software or hardware difficulties.

*Students Preferred Alternative Delivery Method to Lecture Style in the Project's Video:* When planning to use on-line video, instructors might move beyond the video of a lecture and include skits, animated presentations, or interactive exercises. Other students suggested downloadable PowerPoint handouts to accompany the video. One important thing to note is that if video is to be used, an alternate form of content should be provided. Not every student can hear or see a video. This study did not consider the equal access issue for students, but Sarnoff (2003) highly recommended that any modality employed on-line comply with the American Disabilities Act. Therefore, written copies of the video material should be available for students to download. Subscripts below the video image might also be helpful to avoid hearing difficulties.

*Creating On-Line Video Requires Planning, Time, and University Resources:* A great deal of planning went into the development of the clips. First, video had to be digitized and uploaded to the university server. The video was housed on the university Quick-time server. The university's IT department assisted this researcher with this project. The technician in charge offered insight into the different compression techniques. The technician was available through email when questions occurred. The total time to take the video from the original VHS tape to the on-line website was about 20 hours.

### The Reading List

*The Reading List was Perceived as Providing a Satisfactory Learning Experience:* First, 67% (n=13) of the students were satisfied with how the learning experience. Second,

76% (n=15) students reported satisfaction with the delivery technique. Third, a strong correlation existed between perceptions and satisfaction (0.75). Finally, students perceived the reading list as useful. Students believed that the reading list facilitated learning by offering good examples and definitions for the average learner. Furthermore, one student stated that websites had the ability “to offer written descriptions and pictures to help the viewer understand the concepts.”

*Need to Provide Enticing Websites:* Attitudes moderately determined how much time students spent, how satisfied they were, and the perception of experience (see table 23). Websites need to be dynamic so that students with poorer attitudes will be enticed to use them. In fact, students wanted to see more “bells and whistles.” Several suggestions were made for more multimedia. In addition, students wanted to see more interactive puzzles, audio, and visuals. For example, one student suggested the websites should “engage the viewer with a game, a puzzle, etc. that teaches the principles while keeping the viewer’s attention.”

*Although Students Wanted a Shorter Reading List, Time Spent Reading did not Determine Outcomes, Perceptions, or Satisfaction:* Time was weakly correlated with both outcome measures, perceptions, and satisfaction (see tables 22 and 23). Students, however, reported that the length of the presentation was too long and wrote, “too much information.” In fact, when asked how they would develop an on-line delivery technique, five students made reference to the issue of time. For example, one student suggested to bullet the concepts, while another suggested a simple chart.

*Knowledge about the Principles Assisted with Developing the Reading List:*

Knowledge about the principles facilitated the development of the reading list. To mirror Ouellette's (2000) terminology, an instructor serves as a sage by identifying information that presented clear, but diverse, understandings and examples of the content. This researcher searched the World Wide Web to finding relevant and appropriate content for this experiment. The intent provided the student with a diverse view of the principles from a variety of perspectives.

Search Engine*The Search Engine was Perceived as Providing a Satisfactory Learning Experience:*

First, 68% (n=13) reported being satisfied with the perception of the learning experience. Second, 57% (n=11) reported being satisfied with the delivery technique. Third, how students perceived the learning experience was strongly correlated with the satisfaction with the delivery technique (0.70). Finally, students reported that the search engine was useful. For example, one student stated "With one search you received many Websites for information on your topic. Each site gives you other links to the information and the search can be endless;" while another one commented, "I found clarification I needed for punishment and negative reinforcement."

*Trust the Student to Search for and Find Relevant Content:* First, students had high mean scores for acquired knowledge (4.16) despite a moderate relationship with attitudes, time spent, and satisfaction. Also, applied knowledge scores (2.42) were high. Furthermore, students saw the search engine as facilitating the learning experience. For example, one student stated, "Well, I joined the practical knowledge with the theoretical knowledge found

on the Website;” while another stated, “There was one Website I found of an experiment for students, where in the beginning it gave different examples of what positive reinforcement was.”

*Students Wanted Alternate Deliver Methods:* Several students wanted alternate delivery methods from the Internet. The suggestions ranged from including video to providing websites rather than searching. For example, one student recommended, “I would look up the Websites ahead of time and provide the students with helpful websites to use.” One interesting suggestion was to provide a chat room for students to ask questions: “I would have probably had a question and answer section, or more examples of negative reinforcement. Possibly an online chat room, for people to ask questions about these principles.” Finally, students suggested that providing elaborate search terms would make the information more accessible. For example, one student commented, “I think it is very important to have the subject headings appropriately labeled for people to find out more information.”

*Provide Strategies for Searching:* Strategies for searching the Internet would have helped the students. In fact, students in their open-ended comments indicated the need for search strategies. For example, one student said, “I think it is very important to have the subject headings appropriately labeled for people to find out more information.” Another student stressed that providing search terms are important. By providing the search strategies, the instructor is acting as a sage to guide and facilitate students’ knowledge construction process.

Chapter 7 presented a discussion of the findings. Chapter 8 relates the findings to social work academia, presents the limitations, and provides suggestions for further research.

## CHAPTER VIII

### CONCLUSION

The delivery methods were used to facilitate knowledge construction. To that extent, the delivery methods provided content for students to construct their understanding. The acquired and applied scores indicated that students were able to form an understanding of the principles. Furthermore, students were able to accommodate or assimilate what they observed with their prior knowledge. Several students indicated that the delivery methods clarified their understanding.

Instructors can turn to email, chat rooms, and discussion groups to further facilitate the knowledge construction process. Providing a communication forum would give students an opportunity to work in groups to develop meaning. For example, a video describing a client's history can be embedded into a Webpage with a chat room. Students can watch the video and work with their peers to form a case study plan. Initially, by watching the video, they may develop an understanding of the client's presenting concerns. Then, students could log into a chat room where a discussion with peers would facilitate a personal and group construction of the client's problems and formulate a case plan.

Generalization of the findings of this research project needs to proceed with caution. First, this study is descriptive in nature. The study was not undertaken to infer that one group was superior or better than the classroom. The project was to assess how a group of students

responded to different delivery methods. Second, due to the low sample size, group comparisons could be misleading, if not impossible to assess.

### Application to Social Work Academia

One way this research advances the field's knowledge of on-line learning is by offering an investigation into what students want in an on-line delivery method. Instructors wanting to move to on-line instruction need to prepare themselves for the fact that students want interactive, animated presentations, complemented with multimedia content such as audio, video, and imagery. Creating websites that contain that type of content require an advanced understanding of Web Page development and good technical support systems.

This project also offered a descriptive investigation of the three delivery techniques. Results indicated that all three techniques functioned differently regarding the variables studied in this research project. Furthermore, this study combined the empirical data with what students reported wanting in each delivery technique. By combining both empirical and heuristic elements a better understanding of the delivery methods emerged.

### Limitations of the Study

The number of participants in each group is one limiting factor in generalizing the results. A low sample size produces a large sampling error which can cause correlations to occur by chance. Therefore, generalizations between the three methods of delivery are difficult and probably misleading. Similarly, generalizing beyond this study is rather limited.

Another limitation was the absence of a control group. The delivery methods were not compared to a class where a presentation on the principles of behaviorism was delivered.

No statements can be made about whether the delivery techniques would be more or less effective than the classroom experience.

### Further Research

Some issues need to be solved prior to moving these delivery methods into instructors' arsenal of delivery methods. First, several studies should be developed that test the lengths of items, such as streaming video and Web-based text pages. For example, a study should be designed that displays video clips of varying configurations and lengths to solicit student feedback.

This study also indicated a need to narrow down the number of Websites provided for the reading list. A study should be conducted that determines the maximum amount of content social work students are willing to view on-line. Second, future studies need to focus on layout of content on-line. Instructors need to experiment with different formats and layouts of Web pages with various iterations and solicit responses from students.

The ideal investigation would explore the use of on-line videos, reading lists, and search engines in a naturalistic non-experimental setting. Some of the student comments indicated that they would rather be interacting with the delivery apparatuses in their personal environment. Additional research needs to be conducted to identify the types of environments where students prefer to study.

Other types of delivery methods need to be studied in conjunction with on-line video, the reading list, and search engines. Students requested several alternative delivery methods. For example, some wanted PowerPoint handouts, audio, and interactive exercises. Furthermore, research should investigate how a discussion component can enhance the

delivery techniques. For example, have the students watch a video and then respond to discussion question by way of a listserv or discussion group.

Other types of course content need to be examined. Social work students are educated about a wide range of content. For example, can a collection of Websites on working with drug addicts be compiled to produce a similar outcome as produced in this study? Or can a video of a role play of a therapeutic technique provide the content so that students can construct knowledge?

Overall, a more detailed understanding of the length and amount, the layout and organization, and students' learning environment are necessary prior to mainstream deployment of on-line videos, reading lists, and search engines. Instructors, however, should continue to explore creative options to facilitate the knowledge construction process for social work students.

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APPENDIX A

DEFINITIONS OF BEHAVIORISM USED IN THIS STUDY

### Definitions of Behaviorism Used in this Study

From Kazdin, A. E. (1994). *Behavior modification in applied settings*. Pacific Grove, CA: Brooks/Cole.

**Positive Reinforcement:**

Positive reinforcement refers to an increase in frequency of a response which is followed by a favorable event

**Negative Reinforcement:**

Negative reinforcement refers to an increase in the frequency of a response by removing an aversive event immediately after the response is performed

**Punishment:**

Punishment is the presentation of an aversive event or the removal of a positive event following a response which decreases the frequency of that response

**Extinction:**

Extinction refers to the cessation of reinforcement of a response

APPENDIX B  
SOLICITATION LETTER

Solicitation Letter

DISSERTATION RESEARCH STUDY  
USING THE INTERNET TO DELIVER SOCIAL WORK CONTENT

Andrew Quinn

Hello. I am inviting you to participate in a study about the delivery of social work related content using on-line technologies. Basically, I am very interested in student's ability to acquire knowledge when content is delivered on-line. The three methods examined in this study are on-line video, WebPages, and a search engine. Previous studies indicate that students have good experiences on-line. But to date (as far as I can tell) there is no comparative study on the different methods used to deliver on-line. Subjects will be tested on their knowledge acquisition and knowledge application skills.

The study is to take place at a university computer lab that supports headphones. To begin you are to log into <http://www.uvm.edu/~aquinn/dissertation>. You will be randomly assigned to one of the three methods where you will answer some pretest questions. Then you will be given instruction on the principles of behaviorism. Finally, there is a brief posttest. The study should take about 1/2 hour.

APPENDIX C

INFORMED CONSENT LETTER

## Informed Consent Letter

Student Consent: This research has been reviewed and approved by The University of Texas at Arlington Human Research Review Committee. If you have any questions about your rights as a research subject or about a research related injury, you may call a representative of the committee at 817-272-2105. This study is under the direction of Dr. Norman Cobb, School of Social Work, 817-272-3681. Please call for any concerns or questions related to this study.

Subject: Dissertation Survey and Experiment on using the Internet for Learning

Dear Fellow Students:

I am a doctoral candidate at the School of Social Work, University of Texas at Arlington . A major focus of interest is the relationship between reviewing content on-line and knowledge acquisition. This research is being undertaken for the purpose of adding to the body of knowledge on this topic within the field of social work.

This study is an opportunity for you to contribute, through your honest and considered answers, to the body of social work knowledge. Your participation and your answers are confidential and no attempt will be made to ascertain your identity. Your participation in this study is strictly voluntary and you are under no obligation to complete it. Your decision whether or not to complete this study will not affect your grades or your academic standing in any way. Please complete the study only if you are willing to give thoughtful consideration to the questions.

Only the researcher and his dissertation committee (if need be) have access to completed studies.

Completion of this study constitutes your consent to participate in this research project. Your attention to this research is greatly appreciated and your input is highly valued.

Respectfully,

Andrew Quinn  
Doctoral Candidate  
School of Social Work, University of Texas at Arlington  
[I agree to participate in this study, click here to begin](#)

APPENDIX D

SURVEY USED IN THIS STUDY

### The Survey Used in this Study

Please enter the last 4 digits of your social security number. This number will be used to identify your responses:

\_\_\_\_\_

Using the group number to the right, choose the group you are in: GROUP 1

- 1
- 2
- 3

Are you:

- Male
- Female

How old were you on your last birthday?

\_\_\_\_\_

Are you interested in:

- Direct Practice
- Administration

What is your major?

- Social work
- Other \_\_\_\_\_

How long (in years) have you been using the Internet?

- 0-2
- 3-5
- 6-8
- 9-11
- 12 or more

How many college courses have you taken where the Internet was used as an integral part of the class?

- 0-5
- 6-10
- 11-15
- 16-20
- 21 or more

Do you keep track of valuable educational web sites?

- Yes
- No

Do you or your friends discuss/share class-related information found on the Internet?

- Yes
- No

Given a choice, would you take a class that required Internet use?

- Yes
- No

On the average, how often do you search the Internet?

- Never
- Once a quarter
- Once a month
- Once a week
- Daily

On the average, how often do you search the Internet with a specific educational need?

- Never
- Once a quarter
- Once a month
- Once a week
- Daily

For which of the following educational purposes do you use the Internet (check all that apply):

- Consult with Instructor
- Consult with Classmates
- Homework Assignments
- Term Paper Research
- Retrieving Lessons/Notes

Which features of the Internet do you use (check all that apply):

- E-mail
- World Wide Web
- News Groups
- Telnet
- Downloading
- Uploading
- Viewing videos
- Listening to music

The purpose of this survey is to gather information concerning people's attitudes toward learning about and working with computers

|  | Strongly Agree        | Slightly Agree        | Neutral               | Slightly Disagree     |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| 9. Knowledge of the Internet is essential to surviving college.      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 10. The Internet is as important as other research tools.            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 11. I prefer to use the Internet to do research.                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 12. The Internet contains mostly useless information.                | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 13. The Internet is too difficult to use for school.                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 14. I feel the Internet is easier to use than the library.           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 15. The Internet is as informative as the teacher.                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 16. I hate using the Internet for important educational projects.    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 17. I enjoy getting information from books and the Internet equally. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 18. I am overwhelmed when I try to use the Internet for my classes.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 19. The Internet does not particularly excite me.                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 20. Using the Internet makes learning fun.                           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 21. The Internet is an integral part of the educational process.     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 22. I am indifferent about using the Internet for                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

|   |                       |                       |                       |                       |
|---|-----------------------|-----------------------|-----------------------|-----------------------|
| education.  |                       |                       |                       |                       |
| 23. I wish I did not have to use the Internet for educational purposes.     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 24. Using the Internet is as convenient as using the library.               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 25. Access to the Internet for educational purposes is not important to me. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 26. Browsing the Internet confuses me.                                      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Next I would like to ask you to identify the behavioral principle found in each situation.

|  | Positive Reinforcement | Negative Reinforcement | Punishment            | Extinction            |
|--|------------------------|------------------------|-----------------------|-----------------------|
| 27. Johnny's mother ignored the fit her son was throwing over not having an Oreo Cookie.   | <input type="radio"/>  | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> |
| 28. You are jumping on the bed (knowing it is wrong) and your mother walks in and gives you "that look".                                   | <input type="radio"/>  | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> |
| 29. You give flowers to your significant other and they shower you with hugs and kisses. The following week you buy flowers again.         | <input type="radio"/>  | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> |
| 30. You are afraid of the dark. You turn on the light. The room is no longer dark. Next time you walk into the room you turn on the light. | <input type="radio"/>  | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> |
| 31. You mother starts packing your lunch after   | <input type="radio"/>  | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> |

|  |                       |                       |                       |                       |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| she finds out you have been spending your lunch money on candy.  |                       |                       |                       |                       |
| 32. You give up after 10 attempts to turn over your car in the morning.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 33. A baby is picked when she cries. She continues to cry expecting to be picked up.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 34. A battered woman constantly complies with her husband to avoid a beating.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 35. You put money in a slot machine and win 100 dollars. You get excited and put more money in the slot machine.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 36. It is raining outside and you do not want to get wet. To prevent getting wet you put on a raincoat. Next time it rains you put on your raincoat again. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 37. You have your license taken away after your fifth speeding ticket in a year.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 38. A teacher ignores a child who talks out of turn.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 39. You do a job and receive praise. You decide to do even a better job next time.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 40. You have a splitting headache and you take some aspirin and the headache goes away. Next time you get a headache you take aspirin.                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 41. You give up making   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

|  |                       |                       |                       |                       |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| self-defeating statements when you receive no response from your therapist.  |                       |                       |                       |                       |
| 42. You are sent to the principles office after calling the teacher a name. Next, time you think about calling your teacher a name you control your impulse. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Experiment Page

NEED INTRO TO EXPERIMENT

Using the clock on the right please enter the current time in HH:MM format:

\_\_\_\_\_

You are not being timed. I am interested in how long you spend on the task at hand

Using the clock on the right please enter the current time in HH:MM format

\_\_\_\_\_

|  | Positive Reinforcement | Negative Reinforcement | Punishment            | Extinction            |
|--|------------------------|------------------------|-----------------------|-----------------------|
| 1. You are convicted of spying for the enemy and are sent to jail.   | <input type="radio"/>  | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> |
| 2. You receive your weekly paycheck.   | <input type="radio"/>  | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> |
| 3. You put your jacket on when going outside and find yourself warm. Next time you have to step outside you reach for your jacket so you will not be | <input type="radio"/>  | <input type="radio"/>  | <input type="radio"/> | <input type="radio"/> |

|  |                       |                       |                       |                       |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| cold.  |                       |                       |                       |                       |
| 4. You smart off to your classmate and the teacher puts you in time-out. Next time you want to smart off, you think twice.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 5. You stop trying to find a radio station after unsuccessfully trying to tune to one.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 6. You give your child M&Ms to increase the likelihood that potty training will be successful.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 7. A parent finds her child's crying distracting and picks up the child. The crying stopped. Now, every time the child cries the parent moves quick to pick up the child.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 8. A child wanting her mother to sleep in the same bed as her, cries for her mother for 45 minutes, the second night the child cries for 30 minutes, eventually the crying stops and the child goes to sleep on her own. Each night the mother stays in the kitchen and refuses to go into the child's room. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 9. It takes you 30 minutes for your daughter to get dressed because she is watching tv. You tell her that each time she takes 30 minutes to get dressed she will lose her tv watching privileges.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 10. Your teacher calls on you when you do not raise your hand and you hate it.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

|   |                       |                       |                       |                       |
|---|-----------------------|-----------------------|-----------------------|-----------------------|
| You begin to raise your hand and the teacher stops calling on you.  |                       |                       |                       |                       |
| 11. You receive a \$1,000 fine for having a lawn full of trash.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 12. A hypochondriac's requests are ignored by the physician and the patient stops complaining.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 13. You receive a lollipop for letting the doctor take blood without a struggle and next time you are calm and let the doctor draw blood. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 14. You hear a loud noise and you cover your ears. From then on, each time you hear a loud noise you cover your ears.                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 15. You receive an A when you study for an exam. You decide to study for you next test.   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 16. A mother tells her child that she will no longer respond to whining.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Below you will find a scenario. Use your newly acquired knowledge of operant conditioning, develop a couple of sentences for each principle indicating how you would respond.

Scenario

Hannah, a two year-old girl, has been witnessed biting other children in a gym daycare setting. Ellen's behavior is explained by an inability to channel frustration and communicate her needs.

Positive Reinforcement

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Negative Reinforcement

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Punishment

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Extinction

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|   | Very satisfied        | Some-what satisfied   | Neutral               | Some-what dissatisfied | Very dissatisfied     |
|---|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|
| 17. Please rate your level of satisfaction with the way information about behavioral principles was delivered to you. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>  | <input type="radio"/> |

Using the space provided below explain your answer

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|   | Very satisfied        | Some-what satisfied   | Neutral               | Some-what dis-satisfied | Very dis-satisfied    |
|---|-----------------------|-----------------------|-----------------------|-------------------------|-----------------------|
| 19. Please rate the extent you were able to form an understanding of behavioral | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>   | <input type="radio"/> |

|             |  |  |  |  |  |
|-------------|--|--|--|--|--|
| principles. |  |  |  |  |  |
|-------------|--|--|--|--|--|

Please explain your answer.

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If you were going to organize an on-line session about the principles of behaviorism what would you have done differently?

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## BIOGRAPHICAL STATEMENT

Andrew Quinn is currently employed as a technology coordinator at the University of Vermont. His research interests include exploring the role the Internet has in social work education. His publications include a review of SPSS's neural network software and the application of a neural network to study casework turnover. Andrew currently lives in Vermont with his wife and two children.