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Identification of the Institutional Factors Within State Systems of Higher Education in the Middle Eastern States Region for the Adoption of Webinars

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IDENTIFICATION OF THE INSTITUTIONAL FACTORS WITHIN STATE SYSTEMS OF
HIGHER EDUCATION IN THE MIDDLE EASTERN STATES REGION FOR THE
ADOPTION OF WEBINARS

A Dissertation

Submitted to the School of Graduate Studies and Research

in Partial Fulfillment of the

Requirements for the Degree

Doctor of Philosophy

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August 2011

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Abstract

Title: Identification of the Institutional Factors Within State Systems of Higher Education in the Middle Eastern States Region for the Adoption of Webinars

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This benchmark study uses five research questions to examine the institutional factors that impact professors' adoption of webinars to deliver courses. A 62-item questionnaire was used to structure telephone interviews with senior instructional technology administrators from 54 participating colleges and universities located in the Middle Eastern States Region. The 20-minute interviews focused on four areas: institutional organization, faculty characteristics, technical infrastructure, and the technical support available to faculty. The data describes the present state of webinar technology adoption among the participating colleges and universities. Data from the interviews were presented using descriptive analysis, correlation analysis and exploratory factor analysis. The in-depth descriptive data is summarized for each of the four focus areas, including enrollment, institutional setting, organizational climate, long-range planning, course delivery formats, observed faculty characteristics, adoption-decision factors, hardware, Internet access, and technical support. A major finding from the descriptive analysis indicated that nearly three quarters of participating institutions make webinar software readily available, yet less than a third report that webinars are being used to teach courses. Data from the Spearman Rho analyses indicated 52 significant correlations. Findings are presented for enrollment, adopting online learning, observed faculty confidence in using instructional technology, observed faculty opinions about the effects of instructional technology, and observed faculty confidence in available instructional technology. Data from the exploratory factor analysis indicated an initial 13 composite measures from the 47 independent variables. Post-hoc analysis using Cronbach's alpha revealed a final 11 composite measures for webinars adoption. This study found that the participating institutions provide sufficient organizational support to enable the adoption and implementation of webinars for teaching. The hardware, software, and Internet connectivity is generally available throughout the subject pool; yet, with three quarters of respondents stating that web conferencing software is readily available to their faculty, few professors have adopted webinars for teaching. Low faculty confidence in using instructional technology appears to be a factor that limits adoption. This study indicates that more instructional designers and more instructional technology trainers are needed to support faculty implementation of instructional technology, and therefore adoption of webinars in higher education.

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CHAPTER 1 INTRODUCTION

The advent of high-speed broadband internet technology and user-friendly web meeting software has allowed distance education professionals to create synchronous virtual meeting places online (Moore, 2003). Webinar software permits the immediacy of live video conference interactions between geographically dispersed (Beasley, 2003), internet-capable, computer users, and provides a viable alternative to specially equipped rooms that traditional video conferencing requires (Holden & Westfall, 2006). Webinar technology can be used to establish virtual classrooms for distance learning and professional development.

Need for the Study

This research project serves a practical purpose for college and university administrators that want to make informed decisions about including webinars among the instructional technology that they make available to their professors. Adoption and implementation of any innovation may be subject to an array of organizational and individual factors (Ely, 1989; Rogers, 2003). Pitler, Hubbell, Kuhn, and Malenoski (2007) state that technology has the power to transform how teachers help learners construct meaning and acquire knowledge; but simply making the technology available in the classroom does not ensure success (Yakel & Lamberski, 2000). This study identifies factors that may impact successful implementation of webinars.

Statement of the Problem

The United States is an information rich society. The use of information technologies in support of higher education has not reached its full potential because innovations outpace the rate of educator adoption of new tools and methods (Carr-Chellman, 2006; Thomas, 2008). It is necessary to investigate the factors that impact educational technology adoption, and to examine how these factors relate to webinar technology implementation in higher education courses.

Purpose of the Study

The purpose of this survey study is to identify the institutional factors that impact adoption of webinars as a distance education method by individual professors. This benchmark study will provide insights to help educational institutions make informed decisions about whether to include webinar classrooms in their distance education programs. It also identifies obstacles that could inhibit webinar implementation and will provide recommendations that institutions may use to facilitate webinar adoption. Finally, the data collected in this study establishes the start of a longitudinal series of research that examines institutional adoption of webinars for higher education coursework.

Significance of the Study

Increasing demands for online post-secondary education (Allen & Seaman, 2008) has been discussed in our field, but we have seen little or no movement toward webinar-borne education. This study is significant because it provides post-secondary educators with information about issues that could impact adoption of a technology that has economic and pedagogical advantages. In light of current energy demands, educational technology development encourages webinar adoption in several ways. First, a virtual classroom might add the immediacy and presence of a live instructor to online courses that Bird (2004) identifies as a drawback to asynchronous online learning. Second, blended course designs (Beasley, 2003) that augment traditional face-to-face courses with webinar interactions can potentially reduce travel. Third, fully synchronous online class meetings can now be held in the virtual classroom without overpowering bandwidth.

Research Questions

This study will examine five research questions. Four questions focus on one of the following four areas: organization, faculty, equipment, and support. These key areas of interest are determined by combining empirical precedent with the theory and practices of instructional technology integration. The fifth question examines webinar adoption. The research questions that are addressed by this study are:

RQ₁: What organizational factors support college and university use of webinars?

RQ₂: What faculty characteristics support college and university use of webinars?

RQ₃: What infrastructure factors support college and university use of webinars?

RQ₄: What technical support factors promote college and university use of webinars?

RQ₅: What is the relationship between faculty interest in webinars and its adoption in the classroom?

Webinars in Education

Webinar technology provides a virtual space for immediate interactions using multiple forms of electronic media, and this versatility has been successfully integrated to meet a variety of distance learning needs. It has been used to overcome geographic limitations for professional development programs in the U.S. and Canada (Abate, 2008; Curran, 2008; Klecka, Clift & Cheng, 2005). There are indications that stand-alone webinars have pedagogical limitations (Stephens & Mottet, 2008), but these researchers suggest webinars would be more effective in learning programs with repeated use by the same group of participants.

There is also evidence that webinars are being effectively integrated into the high school and post-secondary learning environments. Charles (2007) studied the live interactions among secondary students by implementing webinar learning exercises with an entire class. Bower

(2009) has examined the instructor's role in webinar coursework with different classes. Small group webinars are used to develop the skills of student counselors prior to graduation (Rockinson-Szapkiw & Walker, 2009), and Barresi (2007) augments his student's research efforts by holding small, research group meetings in webinar rooms. Although this new technology is being used with favorable results by innovators in a number of dispersed settings, what factors need be in place for successful use of webinars in college and university courses?

Theoretical Framework

Webinar technology's potential to enhance online higher education has not been fully realized in academe. This study identifies factors that affect the adoption and implementation of this new online technology. This research is based on methods used by Dudt (1985) to identify problems at college-affiliated cable television stations, and by Leidman (1985) to describe operations and issues among college radio stations. A practical result of those studies is that each benchmarked a communication technology that was in use among institutions of higher education, and each provided key information for the administrators of similar organizations. Thus, a descriptive study of webinars in higher education makes a snapshot of this technology's implementation during the winter of 2011, and it identifies issues and problems that adopters may encounter while integrating this technology among their pedagogical methods. The data collected for this study is also examined for correlations among questionnaire-item responses in order to identify relationships within and among the four focus areas, and with demographic descriptors. Finally, the data was analyzed with exploratory factor analysis in order to create indices from the independent variable components. The resultant construct variables might be used to simplify self-analysis by institutions of higher education regarding instructional technology and their readiness for webinars.

Diffusion of Innovations: A General Description

Diffusion research has traditionally sought the causes of an innovation's widespread acceptance within a social group, dating back to Ryan and Gross' (1943) retroactive surveys of Iowa farmers' adoption of hybrid corn seed. Diffusion theory is frequently used to examine the spread of new technologies, and the tenets and principles described by Rogers (2003) are applied in this study to describe findings and examine relationships found in the data. A key feature of the innovations diffusion model is time, which is used to chart the rate at which an innovation is adopted. The results of this study establish a benchmark for adoption of webinars that may be compared with future data collected by this instrument. Collecting data early in the webinars adoption process will mitigate validity concerns like those raised against the hybrid corn studies.

Definition of Terms

- **Adopter** In Diffusion Theory, this is someone who chooses to use a technology or idea. There are five descriptive categories of adopters: *innovators*, *early adopters*, *early majority*, *late majority*, and *laggards* (Rogers, 2003).
 - o **Innovators** The first members of a social group who adopt an idea or technology that is new to that group. Rogers describes their personal characteristics to include an outlook that is more cosmopolitan than their social peers, as derived from travel and education (Rogers, 2003).
 - o **Early adopters** These members follow slightly behind the innovators, and their implementation initiates momentum for adoption within a given social network. Their opinions are held in high esteem within the social structure, giving them significant social capital (Rogers, 2003).

- o **Early majority** This describes those who symbolize the mainstream implementation of an idea or technology. Their decision making is more deliberate. Statistically, this group makes up the 34% of the adopting population that appears on a bell curve in the area directly to the left of the mean, or one standard deviation. This group is essential in maintaining the mass of communications connections within the group, linking innovators and early adopters with the late majority and laggards. Their behavior defines a stage where adoption becomes so widespread that the *critical mass* (defined on the next page) occurs (Rogers, 2003).
 - o **Late majority** This describes those members of a social network who choose adoption in order to keep up with the seemingly insurmountable trend. Their slow adoption-decision process is impacted by economic necessity and increased peer pressure; they choose to adopt once the innovation has proven to have genuine value and benefits to the group (Rogers, 2003).
 - o **Laggards** These are the most traditional members of a social system, basing their decisions on what has previously been effective. They also tend to have the least social connections beyond those who hold traditional values (Rogers, 2003).
- **Asynchronous Learning** This is a common format for online coursework where participants are not logged on to the course's learning management system at the same time. Asynchronous interactions enable online learners to overcome geographic dispersion and time constraints.
 - o **Bandwidth** This is commonly used to describe the capacity for flow of data along wired and wireless Internet connections.

- **Blended (or Hybrid) Course** This is an online learning environment where 30% to 79% of coursework is delivered online. This format blends face-to-face meetings with online content delivery to reduce the number of in-person class meetings (Allen & Seaman, 2008).
- **Change Agent** A person external to a given social system who provides that group's members with information about an innovation; they may play a key role during the second step (persuasion) of the *innovation-decision process* described later (Rogers, 2003).
- **Contingent Innovation-decision** These are choices to adopt or reject an innovation that can only be made after a prior innovation decision (Rogers, 2003). For example, an organization must choose to adopt computers before adopting an office e-mail system or online education. Adoption of one innovation necessarily precedes another.
- **Learning Management Systems (LMS)** These are the online software platforms used to organize and deliver course content material. Common LMS are Blackboard, Desire2Learn, Moodle, and WebCT.
- **Critical Mass** A term borrowed from nuclear physics, it describes the stage of diffusion where enough successful adoptions have occurred within a given population that widespread use of the innovation is inevitable (Rogers, 2003).
- **Faculty** This independent variable includes professors, instructors, temporary faculty, teaching associates, and adjunct professors. Faculty data for this study is from administrator's opinions/

- **High-speed Internet** Commonly referred to as broadband, this is a general term used to describe connections that surpass the data transfer speed of dial-up (traditional telephone service) for accessing the web or a local area network.
- **Implementation** This is when adopters of a new technology or idea customize it for practical use based on their situation. This is critical to the diffusion process because poor success rates can lead to discontinued use (Rogers, 2003).
- **Infrastructure** This independent variable will be defined as the hardware, software, and infrastructure that support web- and network-based learning. It includes such things as LMS, computer headsets, computer labs, high speed internet, on- and off-campus internet access, microphones, speakers, webcams, web-capable instructor stations, and webinar software.
- **Innovation-decision Process** Diffusion theory uses five steps to describe potential adopters' decisions about an innovation. The sequence is (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation (Rogers, 2003).
 - o **Knowledge** The first step is an adopter's awareness of an innovation and includes an understanding of how it functions.
 - o **Persuasion** At this stage, the adopter forms an opinion about the innovation. Two key entities that function during this step are change agents and opinion leaders.
 - o **Decision** This includes taking actions that lead to choosing whether or not to begin using an innovation.
 - o **Implementation** This step occurs when an adopter puts the innovation to practical use. It is during implementation that re-invention (see later) may occur.

- o **Confirmation** Adopters at this step seek reinforcement for their decision to adopt and, during this stage, contrary information regarding the adoption decision may lead to a reversal of the adoption choice.
- **Innovativeness** This is used to indicate an individual or an organization's capacity to embrace, adopt, and implement new ideas or technology. Diffusion theory provides guidelines by which researchers might create metrics to quantify this concept (Rogers, 2003).
- **Observability** This is a key component to the adoption-decision process. It refers to how easily potential adopters may see the benefits and drawbacks a new idea or technology as it is being implemented by another person or entity (Rogers, 2003).
- **Online Course** This is a course where 80% or more of coursework is delivered online with little, or no, face-to-face meetings (Allen and Seaman, 2008).
- **Opinion Leaders** These persons within a social organization have significant credibility among the members. These are early adopters whose knowledge and decisions are respected within the social group, and they play a key role during the persuasion step of the innovation-decision process within a population (Rogers, 2003).
- **Organization** This independent variable concerns an institution's educational mission, the types of degree programs that are offered, its use of online course management learning management systems and courses offered online, and its decision-making style.
- **Re-invention** This refers to how individual adopters customize an idea or technology to suit their needs by modifying their practices from the innovation's intended use. It is considered part of the fourth step (implementation) in the innovation-decision process (Rogers, 2003).

- **Synchronous Learning** Online learning where participants are logged into the course or learning management system at the same time, thus enabling real-time interactions.
- **Technical Support** This independent variable includes the instructional technology staff that is available to assist students with technology issues, to provide faculty with instructional technology help and training, and to assist professors with adapting courses to online delivery. It includes the perceived effectiveness of IT services, as reported by survey respondents.
- **Trialability** A key component to the adoption-decision process, this term describes how easily an innovation may be tested by potential adopters (Rogers, 2003).
- **Virtual Classroom** Online meeting place where synchronous learning takes place.
- **Web Conference** Use of a type of software that allows real-time (synchronous) interactions among attendees, in this study the term is regularly interchanged with webinar. These synchronous sessions may be archived for later reference, used by students to review and study, or by absentees to make up a missed meeting.
- **Web-facilitated Course**
 - This is a course where between 1% and 29% of materials are delivered using web-based technology, such as course management systems, or web pages to post assignments, documents, and syllabi (Allen and Seaman, 2008).
- **Webinar** A combination of the words web and seminar, it refers to using web conferene software to conduct live meetings. This study considers the term as synonymous with web conference.
- **Webinars Adoption** The dependent variable of this study is defined as the use of webinar technology by faculty to teach at subject institutions.

Assumptions

There are several assumptions made in this study. First, the selected colleges and universities would participate. Second, the participating colleges and universities have online learning programs in place at the time of this inquiry. Third, the responses of each institution's representative are assumed to be objective, accurate, and honest responses to the survey questionnaire. Fourth, faculty characteristics are based on the responses given by each institution's representative participant, and not based on direct interviews of individual faculty members.

CHAPTER 2 REVIEW OF LITERATURE

Web conferencing technology is widely used in a variety of diverse applications outside academia; however it has not been used extensively within higher education. Webinars were initially used by businesses to hold meetings without the need to travel, and many professional organizations used webinars to develop, enhance, and measure the skills of their practitioners. Post secondary educators use this tool for professional development, but there is little literature to indicate this particular form of virtual classroom has been adopted for university coursework. Trends in higher education indicate that online learning continues to grow, so a theoretical framework for discussion of the factors that influence webinars is needed.

Several institutional factors may preclude widespread adoption and implementation of webinars in higher education (Allen & Seaman, 2008; Thomas, 2008; Tremblay, 2006). Four key areas of inquiry have been derived from the literature. First is the organizational structure of colleges and universities, another is the online learning and educational technology infrastructure at these institutions, a third area to be examined is how well instructional technology is supported by each school; and finally, the individual traits that characterize instructors and professors comprise another factor that can influence whether a particular instructional technology is used. These factors are discussed in three sections.

The first section of this chapter introduces Innovations Diffusion Theory which is used as a theoretical backdrop for discussing the results of this study. Its organizational diffusion model is used to orient the findings of this study along a continuum of stages. The terminology and categorizations of diffusion theory provide grounds for describing trends in the data, found in chapter 5. A brief review of educational webinars adoption is included in this section.

The second section establishes a basic understanding of web conference technology by clarifying its terminology and capabilities. The synonymous relationship between webinars and web conferencing is established here. A synthesis of scholarly and professional literature is used to summarize some of the key features of this new technology and examine webinars' potential problems and advantages.

The third section of this chapter reviews empirical and other scholarly articles that describe how webinar technology has been put to use, and with what success. It links professional development webinars to higher education classroom use in the context of organizational trends in post-secondary education and the pedagogy of educational technology. Chapter two closes with an overview of trends that have been discovered in the literature.

Theory and Practice of Adoption and Diffusion of Innovations

Innovations Diffusion Theory is primarily derived from the writings of Everett Rogers. Diffusion research of instructional technology is examined to help identify factors that influence webinar adoption. Evidence found in scholarly journals suggests that webinars are commonly used to provide professional development to professors, staff, and administrators of higher education but diffusion studies of classroom webinar usage are scarce.

Diffusion Theory

The basis of innovations research rests on four interrelated elements; an innovation, channels of communication, time, and social system (Rogers, 2003). Its tenets, principles, and terminology are introduced here to frame the discussions of webinars adoption in this study. Basic diffusion research centers on individual adopters; however, the theory has evolved to include analysis of organizations as well. Each of the primary elements of innovations diffusion will be briefly summarized, followed by the introduction of the organizational diffusion model.

Innovations. These are either ideas or technology that is new *within the context of a certain group of people*; newness is not conceptually based on whether the innovation was recently conceived or invented. Potential adopters may relieve their uncertainty through trial and observation where they develop perceptions of its relative attributes. Adopters may *re-invent* an innovation, or customize it to suit their particular needs during *implementation*, which is when the innovation is put into practical use (Rogers, 2003).

Channels of communication and communication methods. Communications plays a key role in the speed with which an innovation is implemented within a particular group of adopters. The modes and methods of communication used by a given social system impact information sharing within the group, as well as the impact of external influences on that group. Communications help to define a social organization's *innovativeness*; put simply, how reactive the group is to new ideas or technology (Rogers, 2003).

Time. This element expresses the cumulative rate of adoption. Diffusion's time element may be impacted by the *innovation-decision process* and the *innovativeness* of adopters (the five steps of the innovation decision process and the five adopter categories are summarized in Chapter1). Adopters in an organization often make *contingent-innovation-decisions*, which may also impact adoption rates.

Adopters are graphed on a bell curve (Fig. 1) and categorized to occupy ranges of standard deviation. The characteristic *S-shaped curve* of diffusion studies appears when adoption is graphed cumulatively. The incline of this slope indicates the rate at which an innovation has been adopted within a population. (Rogers, 2003).

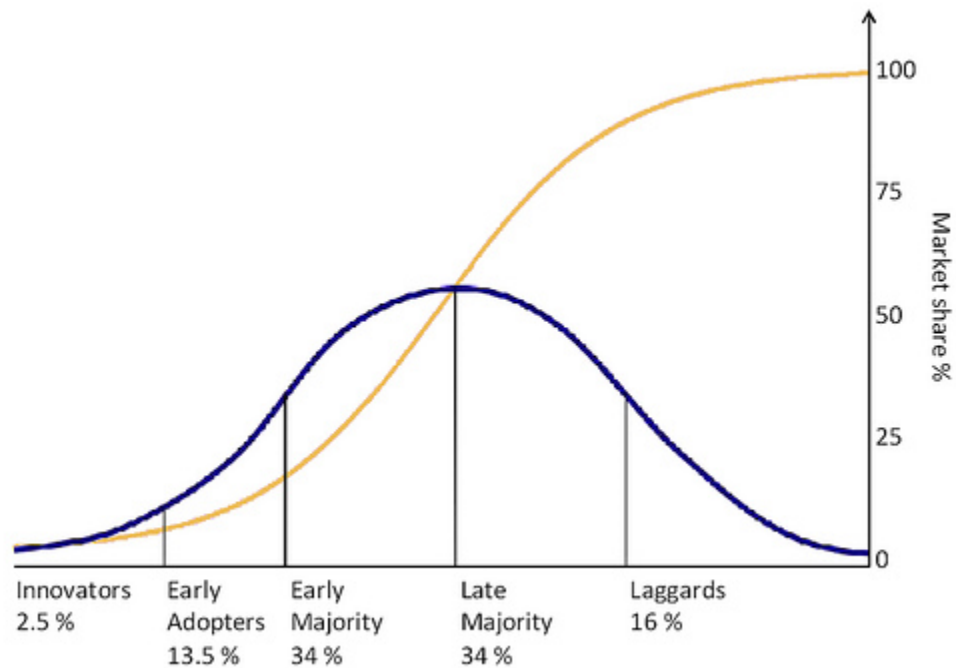


Figure 1. Diffusion of Innovations: Individual adoption and the cumulative S-curve. The bell curve shows more and more consumers adopting an innovation. Note that the early and late majorities each correspond with one standard deviation, and that early adopters and laggards comprise the second deviations. The cumulative effect of this adoption creates the S-curve when graphed over time. Source: <http://www.openabm.org/book/1928/111-diffusion-innovations>

Social systems. Diffusion researchers define a social system as “a set of interrelated units that are engaged in joint problem solving to accomplish a common goal” (Rogers, 2003, p. 23). Heterogeneity within such groups affects adoption of an innovation, as do the group’s social norms. A system’s communications arrangements can impact the influence of opinion leaders due to the rapidity of information flow among members. Characteristics of the social system will also affect the group’s acceptance of external information and the amount of influence that *change agents* have with the group (Rogers, 2003).

Organizational diffusion. A key distinction of organizational diffusion research is that these studies substitute *implementation* as the dependent variable instead of adoption (Zaltman, Duncan, & Holbeck, 1973). The organizational diffusion model includes five stages: *agenda setting; matching; redefining & restructuring; clarifying; and routinizing*, and each of these fall under one of the two major organizational activities, as explained by Rogers.

The innovation process in an organization consists of two broad activities: (1) *initiation*, consisting of all the information gathering, conceptualization, and planning for the adoption of an innovation, leading up to the decision to adopt, and (2) *implementation*, consisting of all the events, actions, and decisions involved in putting the innovation to use. The decision to adopt divides the two stages of initiation from the three stages of implementation. (2003, p. 421)

The relationship among the primary elements of diffusion theory is obvious, and the role of these elements in organizational diffusion cannot be overlooked. These fundamentals frame the data analysis and interpretation found in chapter 5. This theory is used to search for factors that would influence the role of webinars in online higher education.

Educational Diffusion of Webinars

Higher education lags when compared with business training and professional development in terms of synchronous virtual classroom adoption. Webinars for enhancing the skills of educators are provided by professional trainers ("Educate your adjuncts, improve morale and retention," 2006), educational support companies ("Finding the Time for Your Own Learning," 2009), or professional education associations ("Professional Development at Your Fingertips," 2007). Yet this learning method does not appear to have widespread diffusion as a teaching method with college and university students. Early adopters have suggested leveraging the logistical advantages of webinars for higher education recruiting, and using it to meet with prospective students and their families (Epstein, 2006; Lorenzetti, 2008). The United States Distance Learning Association has provided impartial analysis of webinar technology capabilities to educators since 2005 (Holden & Westfall, 2006); however, Levinsen's (2007) research suggests that higher education is not yet ready to use webinars to reach learners.

Webinars have pushed the limits of available bandwidth (Holden & Westfall, 2006) with various implementations of the technology using a separate voice connection via telephone lines to reduce bandwidth demand (Christ, 2005). Recent improvements in software and internet connectivity make these virtual learning rooms increasingly practical, so the reinvention that Christ refers to has become less necessary. As high speed Internet connectivity continues to expand, a portion of the infrastructure required for webinars is available to provide online learners with robust, synchronous interactions.

Rogers (2003) refers to an "uncertainty reduction process" required for making decisions about innovations. With a new and rapidly developing technology, such as webinars, sufficient amounts of information may not be available for interested professors to determine its relative

advantage. Klecka, Clift, and Cheng (2005) found that inexperience with the technology impeded the use of webinars to form e-Mentoring groups for K-12 teachers in Illinois. Teachers disclosed that they now appreciate the value of the web-based mentoring program, but that they only became familiar with the technology because participation was mandatory. Johnson, Levine, Smith, and Stone (2010) suggest that teacher preparation particularly lags in providing their learners with digital literacy skills which they see emerging as a key skill set across disciplines, and they suggest that such training should focus on different ways of seeing and thinking, rather than simply on technology platforms, software, and tools.

Allen and Seaman's annual report for the Sloan Consortium (2008) describes post-secondary educators' aversion to online learning, and part of this reluctance may be attributed to a mix of individual, organizational, and support factors. Adopting courses for online delivery requires time that is not always available (Wilhelm & Wilde, 2005), and teaching online often takes up a greater amount of an instructor's time than face-to face instruction (Dennen, Darabi, & Smith, 2007; Stodel, Thompson, & MacDonald, 2006). Levinsen (2007) analyzed teacher training with the unique teaching skills required for online professors, and suggests that there may be a mismatch between organizational expectations and the methods used to develop online instructional skills. The combination helps explain why there is not yet a critical mass of early adopters to advocate webinar use, nor to support and assist one another in developing webinar teaching communities (Jones & Bronack, 2007). The time required to develop and implement online courses is a critical consideration as colleges and universities adapt their organizational structure to more effectively support their professors' technology integration.

Innovations Diffusion Theory describes the process of technology adoption in stages, and examines the multitude of factors that impact the rate of widespread acceptance of a novel idea

or a new technology. Chang and Tung (2008) combined diffusions theory with the technology acceptance model (Davis, Bagozzi, & Washaw, 1989) to study students' intentions to use web-based courses. By adding the variables *system quality* and *self-efficacy*, they were able to measure students' perceptions and dispositions toward using particular e-learning sites. They also modified their hybrid model (substituting the variable of *financial cost* in place of *system quality*) to measure nursing students' intentions to use online nursing courses (Tung & Chang, 2008). Both studies suggest online learning issues that professors and instructional designers might consider while developing programs, courses, and course materials.

Hester Fuller (2000) applied diffusion theory to correlate teacher technology competence with students' routine academic use of computers. Fuller found that instructor comfort with technology fosters greater learner acceptance of instructional technology. In a pedagogical sense, tech savvy teachers have greater success conveying their messages (content, etc.) to students when using instructional technology; therefore, learner comprehension is greater due to less noise (distractions) during the communication process. Sahin (2005) applied diffusion theory in a qualitative analysis of technology skills adoption among students of a computer skills instructor. This study discovered that the subject instructor has assumed opinion leader status among the faculty of a large Midwestern university. Organizational diffusion refers to such individuals as *champions* (Rogers, 2003), someone who actively advocates for implementation. The professor has effectively adopted technology into the curriculum (providing observability) so colleagues are comfortable seeking advice about implementing technology into their courses, and this professor welcomes the helpful mentor role within the department.

Thomas' (2008) diffusion analysis of Botswana University's technology integration suggests that their rate of technology adoption may not be keeping pace with the rate of

technology evolution. Ten recommendations were made to “put UB back into a path of renewal and rejuvenation” (p. 122) through a team approach to organizational management of technology adoption. Other points of the proposed strategy are: increased training for instructors; use of innovators and early adopters to model technology use and present workshops; revised compensation plans in light of the additional time required for developing and implementing online instruction; and “availability of reliable and adequate technology infrastructure and timely technical support so that all lecturers and students will be able to have easy access to them from anywhere, on campus as well as off campus” (p. 124). Thomas’ proposed plan infers that the four focus areas (organization, faculty, infrastructure, and technology support) used in the study at hand are on target.

Thomas’ study identifies the interrelation of instructional technology, tech support, and faculty characteristics on individual adoption. But professors need not be technology experts to sort through available options and be effective users of current instructional tools (Sahin, 2005). Fuller (2000) has noted the importance of technical support that understands instructional methodology. Instructional design staff can help sort through available technology options and help professors select which tools will integrate most effectively with the curricular goals and objectives. Other options are innovators who provide peer mentoring and support within their department (Sahin, 2005) or communities of practice (Putz, & Arnold, 2001) that share experience, competencies, and ideas.

Diffusion research has been employed to study a range of innovations, from hybrid corn seed adoption (Ryan, & Gross, 1943) to online education adoption (Parthasarathy, & Smith, 2009). Organizational diffusion research techniques have developed along the way, for example, Heikkilä (1995) examined a company’s adoption of computers. The computer adoption study

applies concepts of organization diffusion and the innovativeness of a corporate structure. A key feature of organizational diffusion studies is that they substitute implementation as the independent variable in place of adoption. Zaltman, Duncan, and Holbeck (1973) made this distinction in *Innovativeness and Organizations*. Previous diffusion research had determined organizational innovativeness by measuring adoption or non-adoption of an innovation, rather than its implementation (Rogers, 2003).

In summary, institutional adoption of webinar technology is impeded by a combination of obstacles in higher education. There are instances of insufficient technical infrastructure, minimal knowledge about how to use the new tool, limited opportunities for learning to use the technology, restricted availability to instructional design support to aid professors with adapting and developing course content for online delivery, and the amount of time professors have to explore, analyze, and decide about the resource's utility. There are indications of where resource allocation could move educators beyond some of these obstacles.

Everett Rogers has challenged future diffusion scholars "to move beyond the proven methods and models of the past, to recognize their shortcomings and limitations, and to broaden their conceptions of the diffusion of innovations" (2003, p. xxi). One critique of early diffusion methods is the reliance on the memory of respondents (Meyer, 2004). The benchmark of webinars adoption made by this study establishes a time reference for longitudinal research with the subject pool. This benchmark study will be the basis for future analysis of organizational adoption of webinars, implementation of webinars, and trends in organizational innovativeness.

Functions and Capabilities of Webinars

The next section of this chapter deals with the innovation in question. A description of webinar technology explains its complexities, which become factors in the innovation-decision

process that is explored by this research. In its present form, webinars enable geographically dispersed groups to converge for synchronous online interactions in real time. Webinar software combines an array of interactive multiple media forms that each participant may use with an Internet-capable computer and connection. An etymological examination of the term webinar clarifies how the term has developed in parallel with online and digital technology advances.

The terms *webinar* and *web conference* can, and should, be used interchangeably to describe the practice of gathering in web space for synchronous interactions using multiple media forms (Kajewski, 2006). Software that now combines multiple forms of interactive media in a single platform has evolved parallel with the development of web technology, and this developmental process has led to ambiguous descriptors and confusing terminology that needs clarification. The language of this new technology is not yet clearly defined in scholarly discussion, which inhibits indexation of related studies.

For example, web conference has been described in research studies as synchronous online text interactions (Klecka, et al. 2005), interactions based only on asynchronous web postings (McIntosh, Brault, & Chao, 2003; Repman, Zinskie, & Carlson, 2005), audio conferencing (Baggaley & Klaas, 2006), and the synchronous two-way audio and video interactions presently available with webinar software (Carbonaro, et al., 2008; Charles, 2009). Early web conference forms were often asynchronous and devoid of complex visual elements (Journal of Visual Communication in Medicine, 2008). “The term ‘web conferencing’ was originally used to describe online discussions on message and bulletin boards; however, the term now refers to the process of meeting live via the internet” (p. 76). In some quarters, webinar is described as video conferencing, a less versatile medium. Quinn, Coe Regan, and Schoech

(2008) conclude their review of three web conference tools (which they refer to as “VCs”) with the following summary.

VCs have the potential to change the way educators and trainers teach and practitioners deliver services to clients. They allow synchronous document sharing, text chat, whiteboard discussions, and two way audio video conversations between multiple users anywhere around the globe (p. 103).

Webinar technology combines video conferencing with application sharing and online collaboration tools in software that may be accessed from individual computers with an Internet connection (Cook, 2009), thereby eliminating the need for costly and specialized equipment (Booth, 2010) to enable synchronous two-way voice and video interactions. A key aspect of this description is that webinars are accessed from a desktop or laptop computer, so attending a webinar meeting eliminates the need for people to cluster around videoconference equipment that may be difficult to access (Sedgwick & Spiers, 2009). Web conference technology is “supremely useful” (Thilmany, 2008, p.29) in overcoming geographical distance when the attendees must log in from dispersed physical locations (Cook, 2009; Thilmany, 2008).

Kajewski offers the most concise definition: “The term webinar, a combination of the words web and seminar, is often used when referring to web conferencing” an increasingly popular method “used to convene group meetings or live presentations via the internet” (2006, p. 161-162). This clearly establishes that webinar and web conference are functional synonyms, yet webinars are far more than a live, text-based discussion or a video conference. A case study from *Library Technology Reports* includes an interview with Jeremy Frumkin of Oregon State University, who explained that web conference software “allowed us to hold meetings where we had voice, video, and screen presentation capabilities, as well as collaborative whiteboarding and

document editing” (Boule, 2008a, p. 13). With the agreement that webinars and web conference both refer to synchronous, online meetings that may use an array of interactive media forms, a discussion of these capabilities follows.

Webinar software has augmented capabilities with expansion of bandwidth availability and as related technologies have evolved. Webinar platforms combine multiple visual media forms with synchronous audio to provide users with a variety of live interaction capabilities. A detailed examination of webinar technology’s key elements, its audio, its visual, its synchronous interactions, and its archive capability follows.

Audio

Webinar technology is capable of relaying all forms of audio including two-way and multiple-user speech communications. Short, Williams, & Christie (1976) show audio media’s superior social presence when compared with a written message. Audio messages have been shown to enhance educational case study methods with collegiate social workers in training by expanding the student’s scaffolding for learning (West, 2008). BBC audio archives were among the media forms used to augment traditional text-based case studies. Learners felt that multiple media forms “increased their knowledge content” and “enabled them to better understand the contextuality of assessment and decision making” (p. 669).

Voice interactions distinguish webinars from earlier synchronous Internet environments that were limited to live text interactions (chat, real-time forums); synchronous voice interaction provides a greater degree of immediacy and interpersonal presence than written messages. Cheng, Krumwiede, and Sheu’s (2009) comparison of online focus groups’ interactions with face-to-face focus groups confirms that speech is more effective than typed interactions. They also found that

[T]he visual anonymity and psychological distance of the internet stimulates greater group interaction and, consequently, participants are more willing to express their opinions. Compared with online typing, the use of speaking leads participants to have greater satisfaction and self-disclosure. (p. 237)

Each webinar participant may communicate through a headset that includes earphones and a microphone. Synchronous audio is handled using VoIP (Voice over Internet Protocol) a technology that allows users to make phone calls over the web (*Journal of Visual Communication in Medicine*, 2008). Webinars use this technology to carry its audio components directly through the headset or through a traditional telephone connection (Kajewski, 2006). For participants experiencing bandwidth limitations, a telephone number that connects attendees with the webinar audio feed can be found on the visual interface (note the telephone icon in Figure 2). Accessing the audio signal over a telephone connection reduces bandwidth demand on the individual user's internet connection which improves their video reception of webinars. It now serves as a back-up for attendees having technical difficulties (Quinn, et al., 2008). Experienced presenters routinely supply telephone access information with webinar log-on instructions in an e-mail confirming each participant's registration.

Real time audio interactions offer professors and learners pedagogical advantages in webinars. Two-way audio helps to span an immediacy chasm that's common with asynchronous web forum postings (Häkkinen & Järvelä, 2004). Interpersonal presence engages learners and the online instructor (Rice, 1993; Schutt, Allen, & Laumakis, 2009). Live discussions can be used to actively engage students in making meaning of the content (Bower, 2009). In practice, interactive audio simultaneously benefits all participants because questions are answered and clarified immediately, an advantage over asynchronous text interactions.

Visual

Webinars combine multiple visual elements with live audio. Presentation software, such as Impress or PowerPoint, load easily to most conference tools (Cook, 2009; Kajewski, 2006; Quinn, et al., 2008) and often form the backbone of webinar presentations. The presenter can stream applicable video clips to all participants, or personalize the presentation using a web camera (Boule, 2008b; Cook, 2009; Quinn, et al., 2008). All webinar participants may use web cameras where bandwidth allows. Quinn et al. (2008) recognize that the number of attendee video feeds may tax the flow of data, and they identify methods to work around this issue.

Although many proponents focus on how web conferencing enhances presence among online participants, it does not perfectly replicate the in-person environment. Sedgwick and Spiers (2009) background research for their study revealed evidence that “videoconference-based conversations evince a deterioration of visual cues that include head nods and eye gaze and have fewer interruptions, longer turns between speaker transitions, and fewer turns taken by participants, resulting in less natural and more formal interactions” (p. 3) than face to face meetings. This phenomenon may be extrapolated to webinars that rely on significant web camera interactions. Additionally, the common practice of positioning web cameras above or beside the computer monitor prevents virtual eye contact (Booth, 2010; Thilmany, 2008) which may create psychological dissonance among webinar attendees. Thilmany (2008) identifies a company that is developing a solution that places a camera behind a semi-transparent screen to alleviate this effect. The visual elements that are combined in web conferencing software enhance interactivity beyond previous Internet meeting tools, but these upgrades include drawbacks as well. Such considerations need to be included by course instructional designers and instructors when choosing to integrate this technology.

Interactivity

Media interactivity is increased by giving participants greater control of its content (Ruben & Stewart, 2006). DeVito (2003) describes a communications paradigm for the 21st century that considers multiple originators and receivers of messages within a context that includes noise, effects, and a means for delivering feedback. Synthesizing these ideas provides a description of the Internet learning environment. But can online learning be effective? Constructive learning theorist, Jerome Bruner, lists interaction among his tenets to guide cultural learning; interactions being necessary to pass on knowledge (1996). Palloff and Pratt (1999) note that the quality of human interactions determines the richness of a distance education environment, and those interactions play a role in developing online learning spaces. Bower and Hedberg (2010) recognize that the increased use of multi-modal technologies in online learning environments facilitates more dynamic and interactive learning and results in deeper understanding.

Webinar software augments the previously described auditory and visual interactions with an onscreen attendee list, instant messaging, interactive icons, whiteboards, desktop sharing, and document sharing (Figure 2). An attendee list (Quinn, et al., 2008) allows all participants to see who else is logged into the virtual room and serves as a method of coordinating and directing interactions among participants. This area of the webinar screen can be used by instructors to monitor attendance, and it also provides a feedback mechanism for students. Participants activate an array of icons to signal everyone in the room (Quinn, et al., 2008; Thilmany, 2008). Responses to yes or no inquiries appear in the attendee list, and an activated raised hand icon is reflected beside the participant's name in the attendee list.

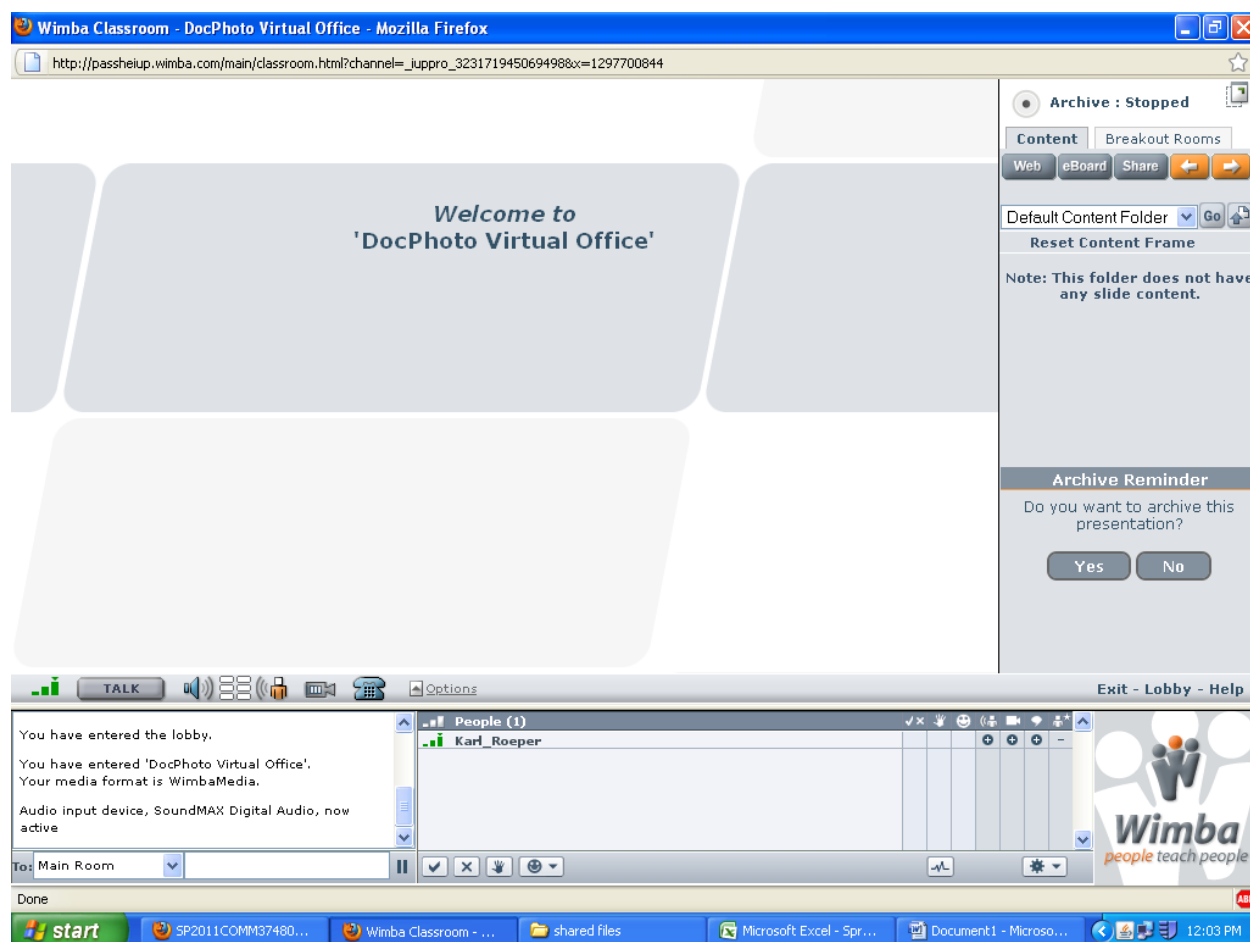


Figure 2. Main room of a webinar interface. This image shows how the main presentation area dominates the screen. A chat area (bottom left), the attendee list (bottom center), and the interactive controls (both below the presentation area and below the attendee list) are shown. Presenter controls are found on the right side of the screen.

Webinar software includes a form of instant messaging that attendees may use to communicate with the whole group or to engage in side-bar discussions (*Journal of Visual Communication in Medicine*, 2008; Thilmany, 2008). These interactions appear in a segment of the webinar screen. All text conversations may be monitored by the presenter so extended off-topic discussions can be discouraged by removing the message privileges of offending attendees. Messaging often serves as a fall-back to overcome the lack of a headset or to bypass audio problems encountered during webinars (Cook, 2009; Kajewski, 2006; Quinn, et al., 2008). Booth (2010) notes that this communication method may be preferred by participants who don't like to speak.

Bower and Hedberg (2010) compared three instructional forms in webinar classes: teacher-centered, teacher-facilitated, and student-centered. They recommend increased student control of content and learning activities in online education. Webinar's interactive whiteboard feature supports this type of pedagogy. Whiteboards enable all users to mark and write on whatever content is placed on them (Boule, 2008b; Quinn, et al., 2008). Participants can work through mathematical formulas or mark up diagrams and maps. The whiteboard occupies the main presentation area while it is in use (Figure 3).

Webinar's desktop sharing feature complies with Bower and Hedberg's (2010) principle of shifting from instructor-centered methods to an instructor-facilitated learning environment. Attendees may join the presenter in browsing the Internet to access and view pertinent materials, or a presenter may permit other users to control the presentation computer (Boule, 2008b; Kajewski, 2006; Quinn, et al., 2008). Desktop sharing may be used to establish a collaborative environment that increases interactivity (Ruben & Stewart, 2006) for learners.

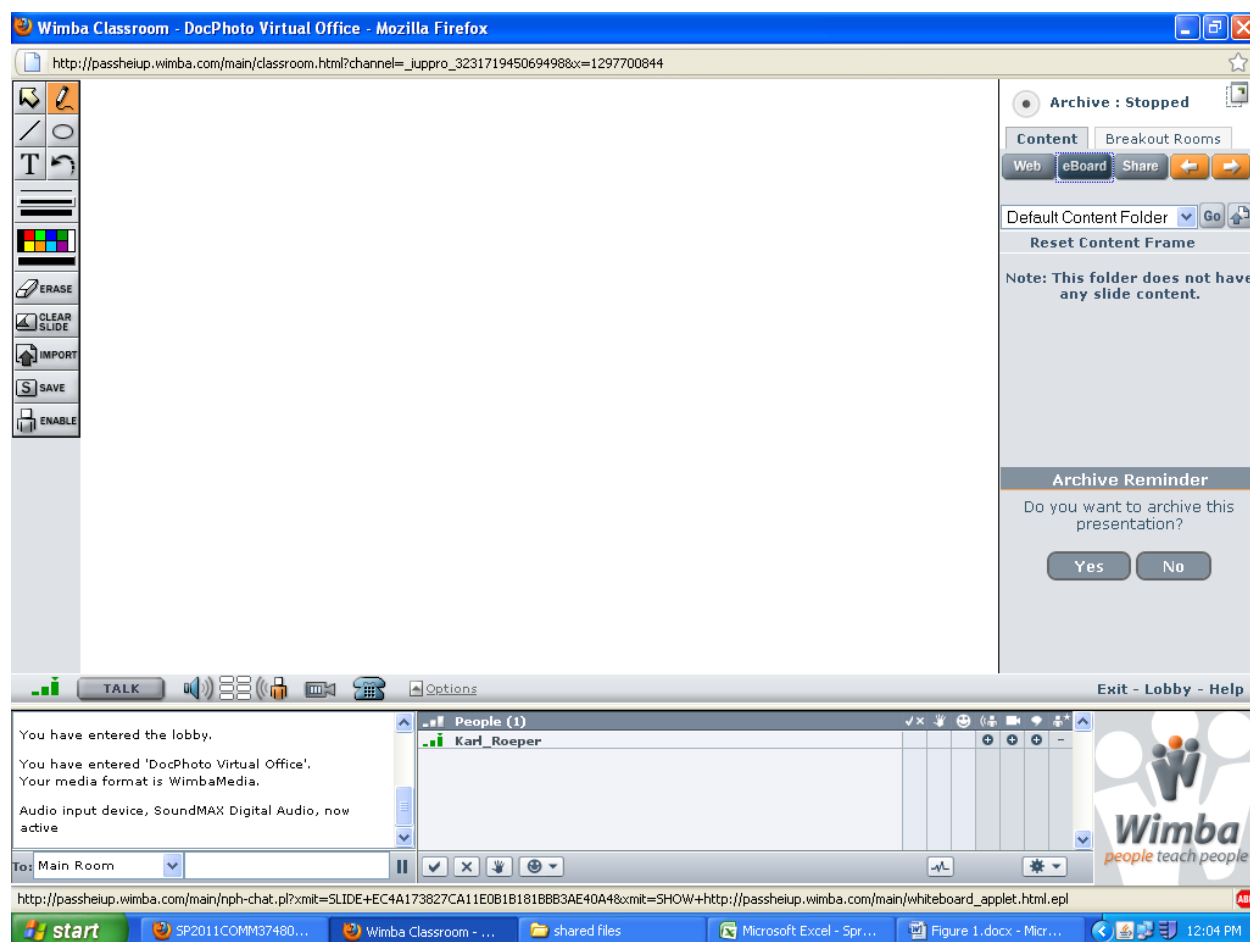


Figure 3. Webinar interface with whiteboard. In this image the main presentation area becomes an interactive whiteboard. A palette of available tools is at the left of the whiteboard area. Note that all of the other interactive controls remain accessible.

Document sharing is a common and convenient feature of the webinar environment that lets participants upload and download files through the virtual room (Boule, 2008b). Professors can distribute course materials, or it may be used for groups of students to facilitate collaborative project work (Quinn, et al., 2008). Document sharing allows synchronous co-authoring and the resultant output can be simultaneously distributed among collaborating attendees.

Archive

Any webinar session may be recorded and saved. The presenter may record each use of the virtual meeting room (Booth, 2010; Boule, 2008b; Kajewski, 2006; Quinn, et al., 2008; Thilmany, 2008), and the archived webinar is then stored on either a remote server, supplied by the webinar vendor, or locally on university storage drives for later access (*Journal of Visual Communication in Medicine*, 2008). Webinar archives can be accessible through a link found in the user's window. For example, the software interface shown in figures 2 and 3 allows access to archives through the lobby, a text link at the bottom right of the user interface. A pair of tabs appears near the top right of the lobby screen (Figure 4); clicking the archive tab lets users browse a list of archived webinars.

Students of a professor who routinely uses webinars to present course content have expressed favorable opinions (personal conversations, October 2009). They feel that the ability to refer back to archives helps them study more effectively. Webinar professors may benefit from this component as well. Instructors may refer to their archives for reflective practice while preparing future lessons. They might assign their learners to view archived presentations to help clarify a topic, or in preparation for other coursework. Archived webinars that describe the steps of a procedure can also serve as readily accessible tutorials.

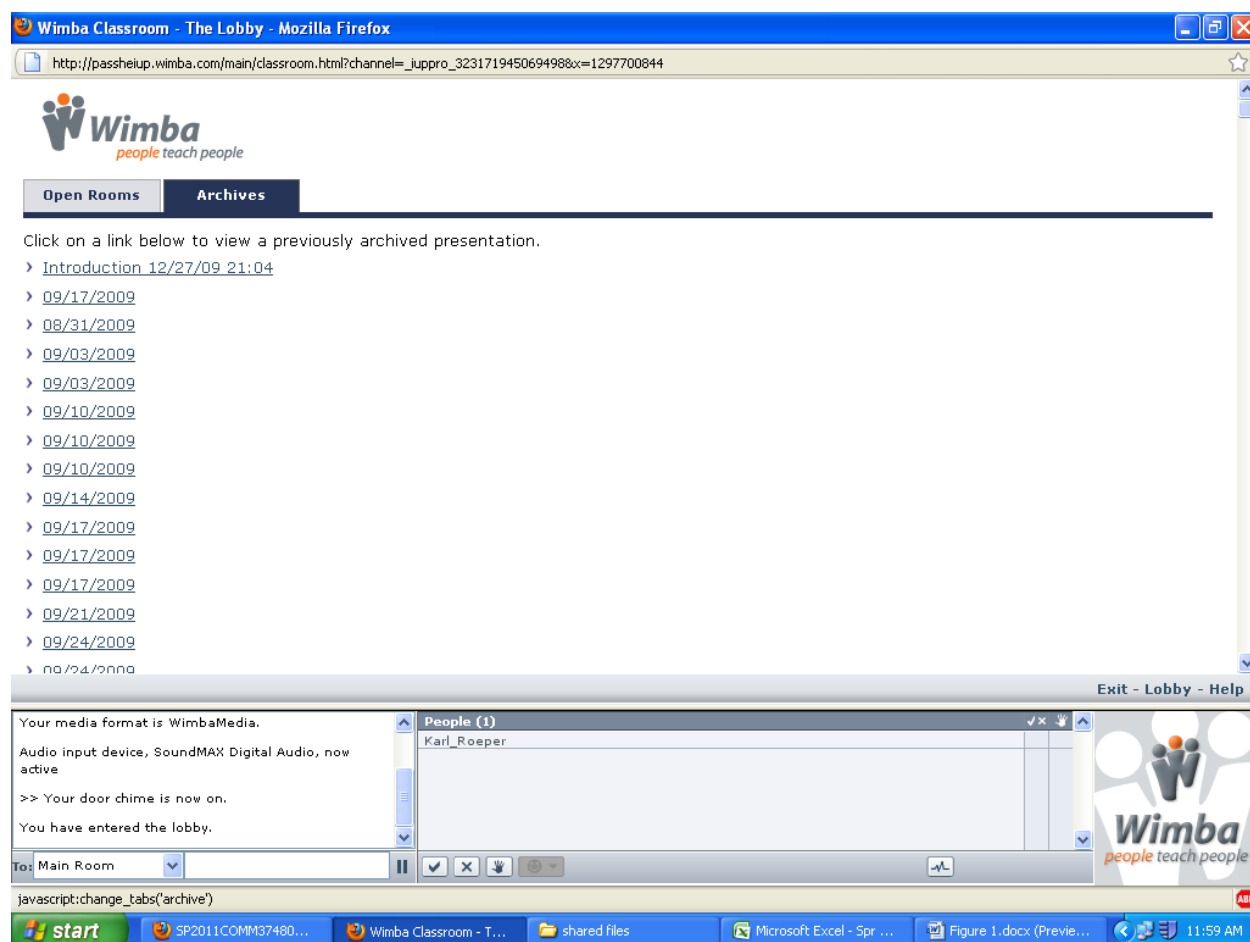


Figure 4. Webinar lobby showing archives. Each of the hyperlinks that appear on the left side of this image connects to a single webinar. Users may scroll to locate the topic of their choice. This image also shows the importance of standardized name conventions among all webinar users so that a logical index will be created.

Content that has been uploaded to the webinar session is stored in the archive, and an index is created within the archive to aid navigation during later viewing. For example, a PowerPoint presentation is indexed using each slide as a reference; this index of topics appears in a contents box that appears on the right side of the archived webinar's presentation window (Figure 5). Selecting a title from this table of contents allows the user to navigate to that specific point in the archived session.

Logistical advantage

Logistical simplicity can positively impact an organization's economic profile. The following examples demonstrate how specific organizational and individual needs are met when webinars are implemented and how technology has been effectively integrated to meet specific goals and reap financial benefits. Cobbeth and Hanman (2009) indicate that webinar's logistical advantage extends to professional development providers who can save on travel and subsistence costs. Wyatt (2007) describes its use among healthcare professionals to keep abreast of current medical practices and update certifications while experiencing less down-time and eliminating travel costs. "Webinars, or web-based seminars remove barriers to participation in professional development due to time, distance and cost" (p. 88). Social workers throughout Texas and Massachusetts benefit from hybrid professional development programs that lean heavily on webinars to marginalize travel (Abate, 2008; MacVarnish, Moultrup, & Ward, 2009). Parsons (2007) concedes that there's no substitute for face-to-face interaction, yet the savings of time and travel is a key attraction of webinar's live interactions for online meetings and distance learning.

Wimba Classroom - Introduction 12/27/09 21:04 - Mozilla Firefox

http://passheup.wimba.com/main/classroom.html?channel=_juppro_323171945069498&x=1300219244

The Content of this class

- The science of energy, what it is and how it is used
 - Work, power, BTUs, Kilowatt hours, Therms
- How society uses energy, and how we can use energy more efficiency
 - Compact florescent lights, home heating & insulation, transportation issues
- Energy sources – existing and future
 - Fossil fuel, hydro, wind, solar, nuclear, tides, OTEC, other
- Environmental consequences of some energy sources.

Archive Navigation

Duration: 38:43

Archive Start	00:00
FREEHAND	00:00
Time Marker +02:00	02:00
YOU CAN SEND ME A IM [Stanley_Sobolewski]	02:23
Time Marker +04:00	04:00
The Content of this class	05:33
Time Marker +02:00	07:33
ARROW	07:48
SHAPE	08:08
ARROW	09:16
wouldn't electricity be used to convert etc? [Mamuyovwi_Mensah]	09:22
Time Marker +04:00	09:33
Time Marker +06:00	11:33
What you will do: Homework	12:00
Time Marker +02:00	14:00
What you will do on-line quizzes	14:23
What you will do: Homework	14:32
What you will do on-line	14:43

Exit - Lobby - Help

active

You have entered the lobby.

You have entered 'Introduction 12/27/09 21:04'.

Your media format is WimbaMedia.

Stanley_Sobolewski says "YOU CAN SEND ME A IM"

To: Karl_Roeper

Done

People (1)

Karl_Roeper

Wimba
people teach people

start

SP2011COMM37...

Wimba Classroom...

disc Wimba Scree...

Ch 1- 3.docx - Mi...

Document2 - Micr...

4:06 PM

Figure 5. Archived webinars example. The index that appears at the right of the screen enables users to quickly access a section of the webinar by referencing these titles.

Booth (2010) recommends an implementation of webinars for employment interviews in many professional fields: “A first-pass or vetting interview that uses Web video can preclude an onsite interview in extreme circumstances, or give a hiring committee a more personal sense of a candidate than is possible via voice alone” (p. 21). Pinnington (2009), a proponent of webinar’s logistical potential, provides recommendations and best practice tips for fellow lawyers who adopt webinar technology. Webinars have been implemented in a variety of diverse organizational contexts, and it is recognized in many professions as a means to save on travel expenses. So what’s holding up a widespread migration?

Summative Analysis of Webinar Capabilities

The preceding summary of features is not all inclusive, and extensive analysis of these features is beyond the scope of this review. The focus, thus far, has been on capabilities and advantages of webinar technology as it has been implemented across disciplines. The innovations decision process considers disadvantages and technical impediments, so these aspects of the technology are now considered.

Webinars enable geographically dispersed groups to converge using an Internet-capable computer, but this interaction assumes high speed Internet connection. Muhirwa (2009) concludes that high-technology online education is beyond the infrastructure of poor and developing countries, and Thomas (2008) has noted that unreliable technology and poor internet connectivity negatively impacted instructional technology diffusion in Botswana. Bandwidth availability still remains a concern in developed nations as well (Sedgwick & Spiers, 2009; West, 2008). A Pew Internet Report (Rainie, 2010) states that only 60% of Americans report having a broadband connection at home. Thus, adoption of webinars for higher education may be limited due to off-campus infrastructure.

Webinar software combines an array of interactive multiple media forms which requires some technical skills and an opportunity for familiarization. Repman, et al. (2005) warn: “Users without computer expertise may find setting up the systems and connecting for a conference challenging” (p. 65), so a trial connection should be made in advance. Rockinson-Szapkiw & Walker (2009) recommend familiarization sessions for learners prior to beginning course content delivery. Such preliminary meetings are necessary for participants “to establish their place in the community and to view it as an open, non-threatening environment” (Klecka, et al., 2005, pp. 418-419). A prerequisite to instructor success in the webinar learning environment is their comfort with the interface and adaptation of their pedagogy (Fuller, 2000; Levinsen, 2007; Sahin, 2005). Webinars require learners and their professors to make preparations and gain experience with the interactive capabilities prior to entering the virtual classroom.

Cost is another issue that may inhibit adoption of webinars. Although the price of virtual classrooms themselves can be prohibitive (Baggaley & Klaas, 2006; Beasley, 2003; Tremblay, 2006), other aspects of webinars cost must be considered. Like other forms of online learning, webinars is developed using a team effort (Klecka, et al., 2005; Thomas, 2008). However, the complexity of its interface has led some to suggest team delivery of webinar-borne instruction that uses a moderator to manage the interface controls, thus allowing the professor to concentrate on content delivery and interaction (Beasley, 2003; Klecka, et al., 2005). The cost in human effort required to implement webinars is not as easily quantified as the financial outlay for one of these virtual classrooms. Balancing these combined costs against the savings generated by logistical simplicity is beyond the scope of this study; however, the human costs are examined in the focus areas of faculty and technical support.

Two additional issues can impact an innovation decision about webinars adoption, and both are related to synchronism. Real time communications give webinars the advantage of social presence (Rockinson-Zapkiw & Walker, 2009; Stodel, et al., 2006). However, synchronous interactions require schedule commitments that limit educational access that many online learners are accustomed to (Repman, et al., 2005), and a trade-off that some learners will choose not to make (Braun, 2008). The second concern with synchronous interactions involves bandwidth demand which is increased by the addition of each attendee (Quinn, et al., 2008).

So even though a university has high bandwidth lines and a fast server, if one student has a slow connection, problems can emerge such as choppy audio and slow frame video.

Since wireless connectivity is typically slower than a hard wired connection, a student using a wireless notebook computer could impose limits on the whole class (p. 97).

There are techniques to compensate for this phenomenon such as limiting class size, limiting the number of simultaneous talkers, minimizing the use of web cameras, and reducing the video frame refresh rate (ibid) that adopting professors and their technical support need to be aware of.

Webinars have an array of capabilities that come with some technical and operational requirements that adopting institutions should consider. These considerations confirm the focus areas of this study. The factors that impact webinar technology adoption in higher education classrooms can be derived from investigation into post secondary educational organizations, their faculty, their technical infrastructure, and the technical support available to users of instructional technology. The next section of this chapter examines the implementation of webinars in a context of learning theory.

Theory and Practice of Webinars

This section describes empirical studies that examine practical applications of learning theory and educational technologies in distance education. The literature demonstrates how webinars have been implemented to provide virtual classrooms for professional development, scholarly discourse, skills training, and university coursework. Taken collectively, these works clarify the importance of exploring this study's four key areas of inquiry, and guide development of the research instrument, as described in chapter 3. It is expected that analysis of institutional organization, faculty characteristics, instructional technology infrastructure, and technical support will identify the factors that impact adoption of webinars in online higher education. Four of the research questions are each aligned to one of these key areas; and the fifth research question will measure dependent variable against the factors that have been identified.

Professional Development

A variety of health care professionals keeps abreast of trends in their disciplines through synchronous online interactions and webinar technology. Ellaway's (2008) discussion of Canadian medical training contains the following observation.

[D]istributed medical education (DME) ...is certainly an ongoing theme in other large countries with sparsely populated remote regions such as Australia, Scandinavia and the United States. It is also an issue in more densely populated areas where student numbers or quality of student experiences involves migrating teaching and learning beyond the locality of the school and the teaching hospital (p. 828).

Geographic dispersion and scheduling restrictions are two challenges to providing development and support to working professionals (Klecka, et al., 2005), and the following announcements found in professional journals indicate organizations that endeavor to meet the

needs of their members through webinars. The British Dental Association launched an eleven-part series of webinars enabling UK dental nurses to maintain their professional certifications ("Free Online Webinar," 2008). Lamaze International provides childbirth education studies via webinars to increase continuing professional education options ("Recertification Deadline -- December 31," 2008). And for professional discourse, The International Society of Medical Publications Professionals offers a series of webinars for members to discuss current ideas and trends (Wasson-Blader, 2008). But these provide no indication of webinar training effectiveness.

Sedgwick and Spiers (2009) conducted ethnographic research into the effectiveness of videoconferencing for meeting with geographically dispersed student nurses during their *preceptorship*. This term describes a mentoring program; each student nurse goes into the field for clinical training where they are paired with a practicing nurse. Student nurses maintain contact with their training institution during this period using telephone and videoconference. The Canadian student nurses preferred the videoconference interviews with their academic supervisors over teleconference, due to the enhanced interaction provided by visual cues which closely resembled face to face discussions. The researchers noted that the limited availability of videoconferencing equipment was a disadvantage in some cases, and they conclude that the desktop nature web conferencing could alleviate this issue.

In the U.S., a concerted effort of Massachusetts agencies created a nine-day curriculum to teach the foundations of local public health practices (MacVarnish, Moultrup, & Ward, 2009). The program was initially developed and implemented with face-to face instruction, using multiple instructors for each of the sessions with some sessions requiring team teaching. Learner feedback led to a third iteration of this program's development – a hybrid format that adopts web conferencing to deliver 6 of the 18 required learning sessions. The program now provides

standardized training for new and recently hired public health professionals throughout Massachusetts. Webinars have been integrated to effectively reduce the scheduling and logistical impediments identified by Klecka et al. (2005) for both learners and instructors.

Webinars have become increasingly familiar among library professionals. Curran (2008) favorably evaluates webinar-borne library standards training in Canada. Analysis of several professional development webinars from the Illinois School Library Media Association found 90% of the library media specialists in favor of future webinar training (Wyatt, 2007). Articles by Boule (2008), Booth (2010), and Kajewski (2006) indicate how library science professionals have been at the forefront of adoption and implementation of webinars by evaluating and demystifying webinar technology for potential adopters and new users.

The following two studies indicate how effectively webinars provide collaborative learning to develop human services professionals. Methods to develop human services counselors' clinical skills are highly interactive and interpersonal; traditionally this training is conducted in a face-to-face environment. Rockinson-Szapkiw and Walker (2009) found that webinars could successfully replicate the live classroom for student role-playing exercises and for case study discussions by these learners. Social workers in Texas created a hybrid program that uses webinars to reach child protective service professionals since they faced tightening budgets and the logistical complications of a geographically-dispersed workforce in need of training. The success of this solution has Texas social workers planning to adapt the model for training in other departments (Abate, 2008). Economic and logistical concerns drive the diffusion of webinars in these occupational fields, implementation of virtual classrooms has reduced costs and improved professional development programs.

Limitations to webinars' effectiveness have been indicated in experiments with stand-alone professional development formats that use webinars to provide a single training session because this format allows little time for relationship building among participants. Stephens and Mottet (2008) examined the effect of computer mediated interactions on trainers and trainees in an experiment that focused on the 'one shot' training model. They found that the interactive features did not increase perceived learning, nor did this format promote trainee satisfaction with the instruction. However, they found that trainer credibility ratings were bolstered by the use of webinar's interactive features; i.e. polling, real-time question and answer sessions, and instructor engagement in chat.

These findings highlight two important considerations. First, learners' inexperience with the communications tools available may have impeded their interactions, but this problem could be overcome with a training session design that includes technology familiarization (Rockinson-Szapkiw & Walker, 2009). Second, the instructor's engaging instructional methods were viewed favorably by participants, thus indicating that online teaching skills and instructional planning can be used to build effective learning relationships in virtual spaces (Schutt, et al., 2009). It follows that interactive rigor among the learners would grow, and the instructor's ability to engage and mentor them would naturally increase during a series of training sessions or through continued use during an academic semester. But developing skilled online instructors (Levinsen, 2007), creating effective instructional materials (Wilhelm & Wilde, 2005), and implementing pedagogically sound instructional methods requires an investment of time and effort that is not always available.

A Shifting Educational Paradigm

Online learning in higher education has customarily used asynchronous communications methods for instructor-to-student interactions and for student discourse and collaboration. This model has been a foundation for the success of purely online universities (Cronin & Bachorz, 2005; Shepard, 2008; Thornton & Irlbeck, 2007) by appealing to students who require flexible scheduling options. The economic success of these institutions has not been lost on traditional universities (Kitto & Higgins, 2003; Yoshimura, 2008), leading bricks-and-mortar institutions to revise business models and upgrade their technical infrastructure in order to establish their online learning presence and attract students who seek Internet-based education. Traditional schools employ the same communications model for distance learning as their web-based counterparts (Braun, 2008, p. 64; Levinsen, 2007), while their professors endeavor to develop the requisite skills for effective online pedagogy.

Adoption of online education has taken place rapidly in some corners of higher education while seeming to lag in other areas and this trend may reveal organizational and cultural factors regarding the diffusion rate of webinars in academe. For example, worldwide adoption of the Internet reached the critical mass stage around 1990 and, within five years, “the Internet connected 20 million computers, a number that began to double annually” (Rogers, 2003, pp. 346-7). The emergence of online universities generally coincides with this trend. Phoenix University established the first online campus in 1989 (2009, para. 4) and debuted their online library collection in 1995. Walden University launched a Ph.D. program in Professional Psychology two years later (2010, para. 15). Strayer University’s asynchronous web-based instruction has evolved with technology to include synchronous learning programs (2007, para. 4). The existing distance education formats at these academies may have expedited their

transition to synchronous learning, while adoption among traditional institutions of higher education lags.

The following individual and institutional factors may explain slower adoption rates for webinar classrooms. A Sloan-C survey conducted in 2007 indicates that nearly half of university administrators believe that their faculties see no value in online post-secondary education (Allen & Seaman, 2008). These researchers have tracked faculty attitudes toward online learning.

Between 2002, when this question was first asked, and 2007 the proportion of institutions reporting that their faculty accept the value and legitimacy of online education increased almost 6 percentage points. This has been followed, however, by an almost 3 percentage point drop for this year (Allen & Seaman, 2010, p.12).

With a general aversion to web-based instruction, faculty adoption of a specific online technique, such as webinars, would face significant impedance among this group.

Parthasarathy and Smith (2009) compared perspectives of online instructors with those of professors who have not taught online and discovered two factors that predict a tendency toward online instruction. These researchers found that professors were more likely to offer courses online when they held two beliefs; 1) that online education put their school in a positive light, and 2) that online courses would help their schools meet market demands. Mitchell and Geva-May (2009) conducted an attitudinal study that helps explain faculty resistance to online teaching. They found that relationships between an individual's position (faculty or administrator), the subject of instruction, and one's level of experience with online instruction could predict, and explain, the formation of respondents' opinions toward adopting online learning.

Personal aptitudes and the professional requirements associated with being a professor also impact post-secondary educators' adoption of online technology. The distinct differences between digital classrooms and traditional lecture halls require professors to adapt their pedagogies and make personal adjustments (Bower & Hedberg, 2010; Levinsen, 2007; O'Dowd, 2007). A self analysis paradigm can help determine one's readiness to teach online (Melancon, 2007); it explains the complex transition to online instructor and suggests that the digital forum is not for everyone. Schneckenberg (2009) argues that university promotion rubrics be restructured because institutional emphasis on scholarship inhibits learning technology integration. Since technology adoption and online course development don't provide career traction that is equal to scholarly publications and conference presentations there is little incentive for tenure-track professors to allocate their time and effort to develop online teaching skills or to adapt courses for web delivery.

Applied Pedagogy

Distance learning in a digital age places new demands on students, as well as instructors. Online learners must have some prerequisite skills in order to be successful in non-traditional educational forums: they need a certain degree of computer literacy and Internet savvy, they need to be self-directed, and they should possess learning styles that are conducive to virtual education environments. Individual learning styles have been identified by Gardener's (1983) theory of multiple intelligences and the ideas of Malcolm Knowles (1990). Bower's (2009) discourse analysis of online teaching suggests that student achievement requires a high degree of experience with the software interface that they are using, and this familiarity helps students adapt to web-based education's altered communications methods.

Online courses use chat rooms and threaded discussion for instructor-to-student and student-to-student communications (Cronin & Bachorz, 2005; Dennen, et al., 2007; Harrison, 2007; Kitto & Higgins, 2003; Lapadat, 2007). Familiarity with online learning technology has resulted in students exploiting the virtual environment to suit their needs. Putz, & Arnold (2001) describe the development of adaptive communications techniques; “The learners make use of the learning architecture as one element in a series of resources and develop their own responses to it” (p. 194). Asynchronous discussions serve certain purposes and synchronous chats meet other student needs. Their presence on online education warrants a brief analysis of each form to establish their relationship to webinars.

Asynchronous text interactions have interactive limitations as well as educational benefits. Lapadat (2002) acknowledges the limitations of discussion board interactions yet concludes that higher order thinking may be enhanced among participants of asynchronous online forums. Repman, Zinskie, and Carlson (2005) suggest that discussion boards can be helpful to students who are shy or learning disabled. But the asynchronous nature of these interactions concerns some online learners (Im & Okhwa, 2003; Stodel, et al., 2006) and challenges student perceptions of the learning environment (Bird, 2004; Dennen, et al., 2007). The interpersonal presence that is normally found in a face-to-face classroom (Jones & Bronack, 2007; Sheehy, 2009; Stodel, et al., 2006) cannot easily be replicated in asynchronous learning communications (Rockinson-Szapkiw & Walker, 2009). Students may perceive the absence of co-presence in asynchronous online learning interactions as an educational obstacle (Häkkinen & Järvelä, 2004; Stodel, et al., 2006), and the limitations of text-based virtual environments can lead to feelings of isolation among some learners. Repman, et al. (2005) indicates that

asynchronous, text-based discussions can be perceived as disjointed – a factor which may prevent learners from enrolling in an online course.

On the other hand, synchronous text interactions can be a liberator of student discussion. Charles' (2007) study suggests a distinct pedagogical difference between webinar discussions in the chat window and what might occur in teacher-led classroom discussions. The instructor placed images in the webinar platform's content frame which prompted spontaneous and candid student comments in the live chat area. Bower and Hedberg (2010) have noted that increased use of multi-modal technologies in online learning environments can facilitate more dynamic and interactive learning. The "poly-vocal" overlap of learners' chat window responses in webinars indicates a change to the student-teacher power structure with modern educational media (Charles, 2007). This relationship is examined by Bower (2009), who compared teacher-centered, teacher-led, and student-centered pedagogy in webinar learning and found that teacher-led instruction maintains topical focus while allowing greater learner engagement. Pedagogical shifts away from teacher-centered online learning paradigms is also supported by Bower and Hedberg (2010), who suggest that decentralized learning results in deeper understanding. Knowles (1990) andragogy suggests that adult learners seek involvement in the learning process by taking an active role in determining what constitutes the learning experience. Thus, webinars may be used to liberate learners from a broadcast paradigm of lecture-based instruction and empower them to actively engage in Socratic discussion.

Online teaching requires methods that will challenge and engage learners. Barresi implements webinars to meet the pedagogical goals of developmental biology courses (2007). Each student uses webinars to meet with the lead researcher on a developing study as they prepare a class presentation about a key research article. Barresi feels this implementation

matches up with all of the course objectives. Webinars help to convey main course concepts, foster student appreciation for the research behind those concepts, build the students' proficiency in science communication, and enhances students' critical thinking in an environment that moves them beyond the role of simple bystanders with a technology that invites them to be intellectual contributors to the field. This use of webinars renders geographic restrictions irrelevant to the process of developing knowledge and thinking that will be critical in the progress of these learners' careers.

Webinars have been employed to enhance an online human services counseling course by overcoming geographic restrictions to enable synchronous learning. Rockinson-Szapkiw and Walker (2009) demonstrate how webinars are used to develop interpersonal skills in a virtual learning environment. "Counseling sessions, role-plays, and live supervision that have been integral components of traditional skills training are being simulated in the online environment using Web 2.0 technologies" (p. 176). This implementation requires students to have headsets; and they must attend familiarization sessions led by the instructors and a technology support specialist to ensure their competency with the webinar interface before they ever use the virtual rooms for coursework. Stodel et al. (2006) stress the importance of training students how to learn in web environments, and the principle is effectively applied with the group analyzed by Rockinson-Szapkiw and Walker. Once students have become familiar with the webinar environment, small group meetings convene to synchronously discuss pre-assigned case studies or conduct counseling skills practice sessions. These webinars are recorded and archived, thus enabling both instructors and students to review what has transpired. Fundamental instructional design is applied here, using webinars to actively engage these learners in developing transferrable professional skills.

The following study of English Foreign Language (EFL) classes at the University of Duisburg-Essen demonstrates social learning (Bandura, 1977) among international students through Internet technologies. O'Dowd (2007) compared three groups of German university students who used email, message boards, online materials, and video conferencing to make intercultural exchanges with students from Ireland and the USA. Each group used a different combination of web-based media. O'Dowd's analysis found that synchronous video enabled rich learner interactions, and that the written dialogues had the advantage of being re-examined by the learners. It suggests that students' multiple intelligences (Gardener, 1983) can be engaged through the online presence (Dennen et al., 2007; Rockinson-Szapkiw & Walker, 2009) that is produced by synchronous interactions or by the deep learning benefits of reviewing the written words of an online post (Lapadat 2000). The students used technologies that weren't yet integral to webinar platforms at the time (between 2001 and 2003), but the implications for present technology are clear. EFL students could use webinars for rich synchronous interactions and its archive feature to achieve the benefits of reflective practice that was previously accomplished with transcripts. This study revealed that successful media integration often depends on matching an appropriate combination of tools with particular learner abilities (O'Dowd, 2007).

College Students of Tomorrow

The following two studies discuss webinar learning applications outside of higher education, but their findings provide pedagogical implications that warrant their inclusion in this review. Charles (2007) analyzed an educational practice that does not exploit webinar technology's real-time audio capabilities, yet found that the students were empowered and engaged. Synchronous postings were prompted by imagery displayed by the teacher in the webinar content area. This study of secondary students at an elite girls' school in Melbourne

found that students “eagerly embraced” the opportunity to post comments in the chat area of their webinar platform; and, in their interactions, they seemed oblivious to the instructor’s surveillance and facilitation of the exercise.

Goldsworthy, Schwartz, Barab, and Landa (2007) analyzed the effects of teachers who assumed the learning facilitator role advocated by Bower & Hedberg (2010) with 5th and 6th grade students from four separate schools in the state of Indiana. The young learners interacted on the discussion board of a web-based learning environment by responding to situation-based videos, and the researchers from Bloomington analyzed the postings. It is unclear whether any of the cross-classroom discussion board posts were synchronous, although the researchers described the interactions as web conferencing. However, Goldsworthy, et al. (2007) conclude that “technology has the potential for supporting collaborative and constructivist learning and for enhancing inquiry, discovery, higher order thinking, and perspective taking in the social domain” (p. 621-622).

Both of these studies provide examples that combine ideas of Bandura’s (1977) social learning theory, with Dewey’s concepts of cognition (1933, 1980), and the principles of instruction delineated by Bruner (1966) and Gagne (1985). Synthesis of these theories guides technology integrators to creatively implement Internet learning tools. Students are learning from their peers while engaged in higher-order thinking. Additionally, the use of webinars in secondary and elementary education provides evidence that some learners are becoming familiarized with the interface before they reach academe.

Implications

The preceding examples show distance learning implementations that reflect webinar technology’s versatility and its potential for positive economic impact. They have also

introduced pedagogical considerations for potential adopters to consider. Higher education could implement webinars and use its benefits to enhance existing distance learning programs, yet an array of developmental costs and human issues must also be considered. A thorough cost-benefit analysis is beyond the scope of this study, although research that examines the hidden costs of course development would be useful to potential adopters, both individual and institutional.

Online professors are challenged to adapt and revise their instructional skills, their course materials, and their methods of content delivery. “The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators” (Johnson, et al., 2010, p. 3). Empirical investigations of instructor methods (Dennen, et al., 2007; Bower & Hedberg, 2010; Schutt, et al., 2009) and student perceptions (Häkkinen & Järvelä, 2004; Stephens, & Mottet, 2008; Stodel, et al., 2006) provide course designers and learning facilitators with information that is relevant to creating, adapting, and delivering online education that focuses on learner context and academic success. Johnson et al. (2010) observe that collaborative student work is increasing. Revised communications techniques (Dennen, et al., 2007; Lapadat, 2007; Levinsen, 2007; Schutt, et al., 2009), different instructional strategies (Putz & Arnold, 2001), and media skills that compliment the instructor’s selected content delivery methods (Repman, et al., 2005) are necessary for student satisfaction and effective learning. These skills, strategies and techniques can help compensate for the reduced instructor presence that is inherent with web-based education (Sheehy, 2009; Stodel, et al., 2006) and, some students still will choose flexible scheduling over interpersonal presence (Braun, 2008).

But faculty integration strategies are not the only factors that impact webinar technology implementation by colleges and universities. Organizational factors that define the mission of higher education institutions come into play. There are also the characteristics of individual

professors to consider, and the level of support they receive for their technology integration endeavors plays a key role. Finally, there is the availability of equipment, software, and Internet connectivity that make up an institution's infrastructure.

Summary: Patterns and Trends from the Literature

Thus far, scholarly research that examines webinar technology use for higher education is limited, a logical condition during the early years of any innovation. The literature is generally useful for its information and insights, yet has shortcomings. A few non-empirical sources were used to meet informational needs, to provide technical background or implementation strategies, and to illuminate current practices with webinars. A handful of related research was culled from the wealth of diffusion studies available in order to establish a theoretical basis for this project. Most importantly, the articles included in this review guide the development of research questions.

Careful navigation of the descriptive terminology thread found in the literature has resulted in clarification, enabling us to use web conference and webinar synonymously. This thread coincides with technological advancements that have occurred during the past decades which relate to, and have become part of, webinar's technical capabilities and requirements. Examination of webinar platform characteristics reveals its capabilities and drawbacks.

Webinars diffusion in higher education follows in the wake of a digital boom in distance learning that resulted from widespread Internet availability. The literature provides evidence that webinars are being used effectively in business and in professional education for healthcare professionals, librarians, and state agencies. These studies of webinars implementation and technology integration provide practical pedagogical guidance for potential adopters in higher education. Scholarly work that addresses webinar's pedagogical effectiveness and which show

varied examples of this technology's implementation has been reviewed. Educational programs that show the greatest success are described in these articles as using the foundational principles of instructional design to guide implementation of webinars.

University coursework presently delivered over the web utilizes distinct interaction paradigms which require specialized skills-sets for both educators and students, and this ongoing transition has impacted the adoption of webinars. Early online pedagogy was primarily based on asynchronous communications, whether the school was an online university or a traditional educational institution. Learners expect a different type of professor in non-traditional learning environments – someone who is comfortable with altered communications methods and who possesses the prerequisite technical skills to effectively facilitate learner engagement with course content and successfully meet pedagogical objectives. There are also prerequisite skills for online learners to succeed in virtual classrooms. This scenario challenges online learning facilitators to evaluate and revise their instructional techniques while also adapting their course content for effective delivery in virtual classrooms.

Prevailing themes among the literature correspond with the key areas of interest for this project. This study examines the institutional factors that would support adopters of webinar technology and gathers preliminary data about who is using webinars in higher education. These factors are organization, faculty, infrastructure, and technical support. Many of the included articles describe organizational factors that effected webinar adoption. There are direct references to instructor methods and technology skills, and discussion of how time and content adaptation creates concerns among instructors, trainers, and professors. Only a few of the empirical studies discuss hardware and infrastructure in depth, though these considerations are detailed in many of the other articles reviewed here.

Technical support receives moderate attention, yet this factor is not prominently discussed in the scholarly literature. Obstacles that have impeded the adoption of webinar technology are identified. Bandwidth appears throughout the literature as one technical drawback, yet procedures for overcoming digital data flow limitations are also shared. Professors' technical savvy and their limited web experience are frequently noted in research studies; however, learning programs that have shown the greatest success with technology implementation have included training and familiarization allowances. As technology continues to evolve and effective pedagogical practices are established, webinar technology has the potential to create a niche in online learning.

In sum, the literature provides critical information needed to describe webinar technology; the literature helps to identify the key factors that are addressed in the research questions that guide this study, and a theoretical basis for discussing the findings.

CHAPTER 3 RESEARCH DESIGN

This chapter describes the methods used in this study for collection and analysis of data. The participants are identified, as well as the independent and dependent variables. Development of the survey instrument is described in detail, followed by an itemized outline of the procedure used to determine the sample. Descriptions of validity checks and the pilot study procedure are followed by a discussion of instrument reliability to complete the chapter.

Data Collection

Survey research was used to collect current information that could be quantified for analysis (Berger, 2000). Questionnaire-based interviews provide structure that allows researchers to collect a great deal of information that may be used to make valid generalizations about the population.

Telephone interviews were utilized to administer the questionnaire to ensure a high rate of response from the population under study, a purposive sample of higher education institutions. This method was chosen based on the experience encountered by Dudt (1985) with mail-out surveys and what this researcher has experienced with low response rates from online survey instruments. It was anticipated that the telephone questionnaire could compensate for this phenomenon.

Method

The researcher collected data through structured telephone interviews using a Likert scale questionnaire (Appendix B) and conducted from January 3, 2011 until February 28, 2011 by the principal investigator. One trained research assistant, a graduate student with extensive background conducting telephone surveys, was used during the first two weeks (January 3-7 and January 10-14, 2011) to help with making the initial contact with participant institutions and set

interview appointments. This assistant conducted one telephone interview and created a disposition spreadsheet that was used to track contact status and monitor progress of the research project. This form was updated daily to reflect type of contact, interview appointments, completed interviews, and changes in contact information.

A paper copy of the survey instrument was completed during each interview as the questions were addressed to the respondents; these questionnaire instruments were archived once data had been coded into SPSS. Clarifications were made at a participant's request and items were restated as needed. Each institution's name was filled in on page 2 of the questionnaire, and each respondent's contact information was recorded in pencil on page 7 prior to the telephone connection to expedite the interviews; the contact information was confirmed at the close of each interview after asking the respondent if a copy of the survey results was desired.

Data Analysis

All 54 of the completed instruments (94.7% of the potential research population) were manually coded into SPSS by the investigator. The 62 questions creating 336 data points per instrument resulted in a total of 18,144 data points for this research project. This information was analyzed in several ways.

Descriptive statistics are used to summarize the data, and frequency tables were examined for trends in the data. These tables are also used to identify factors that might impact webinar technology adoption. Spearman's Rho is used to measure correlations among 51 scale variables; this measure is appropriate for comparisons between ordinal variables (Buddenbaum & Novak, 2001; Rainaud, 2006). A number of relationships have been identified at the .05 and .01 significance level for two-tailed analysis. Factor analysis has been run in SPSS to identify 11 principal components that account for 77.6% of variation in the dependent variable.

Why Use a Quantitative Methodology

This relational study uses nominal and ordinal data to describe variables related to instructional technology. This data is the product of categorical and scale responses to a survey questionnaire (Appendix B) that has been numerically coded so that correlations among certain variables might be examined. This investigator hypothesizes that the interactions of variables will identify factors that influence the dependent variable *webinars adoption*.

Participants

It was determined that a survey of all colleges and universities in the United States would be unmanageable and that interviewing a well defined (purposive) sample was most appropriate for the researcher's goals. A purposive sample is based on the knowledge and experience of the researcher, which is used to set criteria for selecting a sample that is believed to represent a given population (Gay, Mills, & Airasian, 2006). The population under consideration is made up of public colleges and universities that grant graduate degrees, excluding research intensive universities. In essence, the population is a comparison of Pennsylvania State System of Higher Education (PASSHE) schools with comparable institutions in Pennsylvania and the surrounding states for a regional pool of participants.

A single representative was identified for each institution. The ideal candidate was a senior administrator who could most accurately characterize the school's instructional technology profile from a macro perspective. Participant representatives were identified as the institution-level Dean of Instructional Technology, Director of Instructional Technology, Director of Information Technology, or their designated representative. At the conclusion of the data collection period, 54 of the 57 schools in the subject population had completed their interviews, resulting in a response rate of 94.7% for this study.

Sample

The sample technique for this study is a census of select colleges and universities in the Middle Eastern States region of the United States as found in *The Carnegie Classification of Institutions of Higher Education* (Carnegie Foundation, 2001). This geographic region is comprised of Delaware, Maryland, New Jersey, New York, Pennsylvania, and the District of Columbia.

The regional subject pool was further stratified to include the City University of New York (CUNY), the PASSHE system schools, the State University System of New York (SUNY) and comparable institutions in the region. A list of participant institutions was made by using online data filters from the *Carnegie Classifications Data File* (Carnegie, 2010) as described below. Filters were chosen according to parameters of institutional similarity that are common to the PASSHE model.

Sample Criterion

The pool of 57 subjects for this study is compiled from four database sets using the Carnegie Classifications of Institutions of Higher Education Index online at http://classifications.carnegiefoundation.org/lookup_listings/standard.php and activating the following filters. Region was defined as *middle-eastern states*, and the results include those states previously listed (Delaware, Maryland, New Jersey, New York, Pennsylvania, and the District of Columbia). The *Public Institutions* filter was added to select PASSHE and similar institutions. Each of the three sizes of *Masters-granting colleges and universities* (small, medium, and large) were individually selected in order to include 13 of the 14 PASSHE universities. The *Doctoral/Research Universities* category was then used as a filter to include IUP.

Sample Management

Each of the four data sets produced by filtering the Carnegie website was downloaded as a CSV file. These downloaded files were then compiled to produce a single subject pool file in Excel. This spreadsheet file was then enhanced to include columns for the name and contact information of each school's representative, and then saved as *Masters & DRU Middle Eastern States* (Appendix A).

Identification of each school's representative was made by searching the web site for each institution and recording the contact information in the spreadsheet *Masters & DRU middle eastern states*. No contact was made with any institution until research approval was granted by the Institutional Review Board (IRB) at Indiana University of Pennsylvania. Once IRB approval was obtained, telephone calls were made to verify the school representative and to create interview appointments. Any necessary corrections regarding the institutional representative and the individual's contact information were made to the spreadsheet during these initial contacts with each institution. The spreadsheet file was updated daily to reflect the results of school contact attempts, interview appointments, and completed interviews.

Independent Variables

Organizational Factors

Organizational innovativeness has been shown to impact technology adoption (Rogers, 2003) so the independent variable organizational factors is used for this instrument. It is the first of three independent variables adapted from the questionnaire used by Dudt (1985). The first major section of the questionnaire collects data about organizational characteristics of each educational institution. Each question in the section represents a separate independent variable, and these may also be combined to form composite measures and describe constructs.

Faculty Characteristics

These data are characterizations as reported by the respondents, based on their observations of the institution's faculty. Dudt's independent variable, named personnel, has been renamed faculty characteristics; it is a valid area of inquiry for this study because the end users of a technology are a component of organizational innovativeness. These persons are the potential integrators of educational technology who would implement webinar technology if it matches with their skills and pedagogical goals. Chung and Tang (2008) examine aspects of trialability (Rogers, 2003) in their evaluation of user tendencies to adopt online learning. Although their study examines the student perspective, the discussion identifies concerns about online learning interfaces that must be considered in evaluating faculty preparedness to adopt a technology. Questions in this section of the questionnaire represent separate independent variables which may also be combined to form composite measures and describe constructs.

Infrastructure

An adaptation of Dudt's independent variable "equipment", for the purpose of this study, infrastructure refers to the hardware, software, and internet connectivity necessary for web conference technology. This section goes beyond the physical aspects of infrastructure to explore how users think about the available technology. Chung and Tang (2008) identified perception of system quality as having a direct and positive effect on students' inclination to use educational websites, and their results are consistent with the findings of Chiu, Hsu, Sun, Lin, and Sun (2005) who investigated the continued use of E-learning. The perceptions of instructors and students are critical components of educational technology adoption. Each infrastructure question represents a separate independent variable, and these may also be combined to form composite measures and describe conceptual constructs.

Technical Support

Studies made by Fuller (2000) and Yakel and Lamberski (2000) found that technology support may impact educational technology adoption in a positive fashion. Fuller (2000) further suggests that the effectiveness of technical support is related to two factors: 1) the staff's experience with practical pedagogy, and 2) their familiarity with the course content that is to be adapted for delivery using technology. Questions in this section represent separate independent variables, and these may also be combined to form composite measures and describe conceptual constructs.

Dependent Variable: Webinars Adoption

This variable is measured twice. A yes or no question in the general information section simply asks whether webinar technology is currently being used. Webinar adoption is also examined using a series of four Likert scale statements within the faculty section of the questionnaire (Appendix B). This series is meant to characterize the innovations-decision process in a condensed sequence which ranges from awareness, adoption, advocacy, and discontinued use of the innovation. Results of these measures can be compared with composite variables derived from the questionnaire's focus areas or with individual independent variables taken from within these key inquiry areas.

Instrumentation

The instrument was developed in multiple stages from an initial question list generated by the primary investigator. Early iterations of the questionnaire used multiple scale-types, in an effort to incorporate two aspects of diffusion research: time, and innovativeness (Rogers, 2003), and variations of the six-digit "degree of problem" scale used by Dudt (1985).

Using the survey to guide structured interviews would facilitate time management. A key consideration was to minimize the amount of time requested from each respondent. The investigator's intent is to limit the structured portion of the interviews to less than 20 minutes, recognizing that some respondents will volunteer additional information and qualitative insights.

Consideration was given to the idea of sending each participant a visual reference to expedite switching between scales, with questions clustered according to the appropriate measurement scale. This advance organizer could be mailed out along with a letter confirming the interview appointment and the informed consent form. A disclosure statement could be read at the outset of the telephone interview. These techniques were meant to minimize the time required of subject respondents during the actual telephone interview. This concept did not prove effective during the pilot study, so it was not used during data collection (see *Final instrument Changes*, later in this chapter).

A draft of the questionnaire and the proposed advance organizer was prepared for initial testing and analysis. Each section of the instrument corresponds with one of four focus areas addressed in this research. Questions were sub-grouped within each section to accommodate a particular response format. Measurement scales were created for these sub-sections and referenced with roman numerals for rapid coordination during the interview. Five scales were compiled on to one sheet that would serve as the advance organizer, and these scales were also placed in the corresponding locations (preceding each question cluster) on the instrument to keep the interviewer oriented and remind them to alert their subjects to scale changes during the interviews.

Revisions

A series of draft revisions were made based on the initial validity check, a live read-through conducted with a telephone survey expert. Revisions were made based on the consultant's input to address structural flaws in the instrument. First, the questionnaire was trimmed to eliminate redundant and unnecessary questions. Next, the majority of items were rephrased to elicit 5-point Likert scale responses. Statements are phrased in a positive manner with the following coding scheme used by the interviewers: Strongly Disagree = 1, Disagree = 2, Neither Agree nor Disagree = 3, Agree = 4, and Strongly Agree = 5. Exceptions to this scale are nominal data requests and dichotomous questions. Transitional statements were also added between clusters to serve two purposes. These statements would help focus respondents on the topic area of questionnaire subsections and distinguish between yes or no questions and Likert scale statements.

Pilot Study

The questionnaire was analyzed using a key leader advisory group of four instructional technology experts at Indiana University of Pennsylvania. This panel was comprised of the Dean of Technology for the College of Education and Educational Technology, the Assistant Dean for Technology with the Eberly College of Business and Information Technology, the Assistant Dean for Technology at the College of Humanities and Social Sciences, and an Online Learning Specialist from the Office of Distance Learning and Continuing Education. Interviews with each of these experts were made by appointment, and the questionnaire was presented as if they were the actual survey respondents.

Each interview was timed, with the investigator coding the responses on a paper copy of the questionnaire. None of the interviews ran more than 23 minutes. This time included

instances where statements were repeated for clarification, brief discussions of spontaneous feedback regarding the structure of individual statements or the questionnaire, and instances where additional information was volunteered that could qualitatively enhance the data. Notes were made by the investigator during the interviews regarding potential clarification issues to be addressed. Further notes were made during the post-interview feedback sessions in order to ensure the questions accurately asked for the desired information. The majority of instrument modification suggestions made during the expert panel validity checks concerned clarification of the questions. Most of the recommended changes were made, as detailed below.

Final Instrument Changes

This section provides details of revisions made to the survey instrument after reviewing the pilot study results. The completed questionnaires were compared with each other by the investigator once all of these pilot interviews were completed. Final changes to the instrument and several procedural changes were decided at this time.

There were two changes made to the introduction page. A disclosure statement, an IRB requirement, was added to the introduction that is read to each participant before beginning the instrument. Placing it here eliminates the need for mailing a disclosure statement with a written request for informed consent since participation in surveys is generally understood to imply the consent of the participant (Buddenbaum & Novak, 2001). Additionally, the statement helps to introduce the questionnaire and provide clarity to the subjects. The second change eliminated references to making recordings of the interviews, and a statement requesting the participant's permission to record was dropped from the 'format' paragraph of the instrument introduction. Data would be coded directly from the completed paper instruments, which would serve as the research archives.

The final version of the questionnaire (Appendix B) includes several introductory statements, including the disclosure statement and a summary of the instrument format. A brief section on general information about the institution is followed by four sections of questions and Likert scale items. Each section includes a group of items that focuses on a key research area that corresponds with one research question, and this question matches with one of the independent variable groups. There is a section about institutional organization, another about faculty, a third section that focuses on infrastructure, and a section that asks about technical support. The last page of the instrument contains a question about whether the respondent would like to receive a copy of this survey's summarized results, with spaces available to verify the respondent's contact information and mailing address.

Validity

A questionnaire based on the instrument used by Dudt (1985) provides initial validity because it explores the factors that can impact media technology implementation. It identifies three of the four focus areas examined in the present research, and provides a framework for the questionnaire that was developed. Dudt's work also validates the telephone interview method, as well as providing the practical usefulness of a benchmark study.

Survey methodology was used by Heinrichs and Lim (2010) to identify the competence gap among future library science professionals with information literacy skills. Their research established a benchmark that could be used to measure progress in closing the gap, and it suggests measures to be taken to address the issue. Chang and Tung (2008) used Likert-scale questionnaires to measure student inclinations toward using online learning environments and to identify trends in technology adoption. Fuller (2000) applied diffusion theory to analyze archive data about teacher technology adoption in K-12 schools. Diffusion theory (Rogers, 2003) was

used in developing the instrument for the research at hand, with an eye toward future longitudinal diffusion research made with this instrument.

Instrument validity was checked through consultation with a professional telephone survey-taker and designer of questionnaires. Validity checks of this nature are supported in standard instrumentation practice (Berger, 2000; Buddenbaum & Novak, 2001; Gay, et al., 2006; Rainaud, 2006). Validity consultation improved the flow of the questionnaire for structured telephone interviewing and helped to ensure question clarity prior to the pilot study. This step was useful in translating a survey written for the eye of respondents into one which that was written for their ears. The consultation included a practice read-through of the questionnaire that revealed that the investigator's intended time parameter of 20 minutes had not been met. The consultant noted three considerations relating to the time spent on the interview.

First, despite clear prompting to orient the subject to the appropriate scale for a group of questions, time was lost during each transition (L. Fulton, personal communication, November 4, 2010). Second, many of the questions had to be repeated or required clarification. The consultant suggested that each cluster of questions be preceded by an introductory statement that would help respondents' cognitive orientation. The third consideration addressed redundant questions and the removal of items that are not germane to the investigation. The instrument was revised based on these recommendations before the pilot study was made.

Reliability

There are several things to be considered regarding the method and instrument used in this study. Instrument reliability cannot be accurately determined with the first field application of a newly designed data collection questionnaire. Despite the rigorous instrument development process detailed above, a good questionnaire is difficult to produce (Berger, 2000).

A self-report data collection method is vulnerable to self-report bias. Therefore, it is understood that some participants may skew the results by providing responses that reflect more favorably on their institution than might be obtained by a completely objective observer (Berger, 2000; Buddenbaum & Novak, 2001; Gay, et al., 2006; Rainaud, 2006). Another consideration is the human potential for error that accompanies interview data collection methods (Buddenbaum & Novak, 2001). This study did not pose inter-coder reliability concerns since nearly all of the interviews were conducted by the primary investigator; however, the potential for inconsistency exists.

This study has resulted in a census of the subject population, and these results are valuable for inter-group comparisons. Additional studies conducted using this instrument could be a basis for making generalizations, but this process is beyond the scope of the research at hand.

CHAPTER 4 RESEARCH FINDINGS

The following is a description of the data collected using the survey instrument and research methods described in Chapter 3. Each item on the questionnaire represents a potential factor to webinar technology adoption. Information was collected through structured telephone interviews, based on a survey instrument, which were conducted during January and February of 2011. Characteristics of each questionnaire item were converted to numeric variables during these data collection interviews by marking a hard copy of the instrument as each participant responded to Likert scale statements and yes/no questions. Findings are presented in three forms: descriptive data, variable correlations, and exploratory actor analysis.

Descriptive Data

This data is grouped to coincide with each of the four focus areas for this study of webinars adoption in higher education (organization, faculty, infrastructure, and technical support). The organizational and infrastructure sections have subsections based on the item groupings used on the questionnaire. There are no subgroups in the general demographics, administrator opinions of faculty characteristics, and technical support sections.

Demographic Information

Participant institutions were categorized according to their total enrollment, and this data is summarized in Table 1. Ten of the 54 institutions (18.5%) have fewer than 5,000 students enrolled. Nearly half of the schools (48%) reported enrollments between 5,000 and 10,000 students. Seven have between 10,000 and 15,000 students (13%) and another seven reported enrollments between 15,000 and 20,000 students. Four institutions (7.4%) reported more than 20,000 students.

Table 1

<i>Enrollment</i>		
	<i>N</i>	
Less than 5,000 Students	10	18.5%
5,000 - 10,000 Students	26	48.0%
10,000 - 15,000 Students	7	13.0%
15,000 - 20,000 Students	7	13.0%
More than 25,000 Students	4	7.4%
Totals	54	99.9%

Location categories are urban, suburban, and rural, and there is a balanced distribution of campus settings. Urban settings were reported by 29.6% of the sample, suburban locations by 40.7% of respondents, and rural areas by 29.6%. This data is presented in Table 2.

Table 2

<i>Setting</i>		
	<i>n</i>	
Urban	16	29.6%
Suburban	22	40.7%
Rural	16	29.6%
Totals	54	100.0%

Next, respondents were asked whether webinars are currently in use at their institutions. Nearly one third reported that webinars are not presently in use by any of their professors (29.6%) while 35 of the 54 schools (64.8%) said that there is at least some use of webinars for teaching students. There were three institutions that did not respond to this question.

The majority of the 35 institutions currently using webinars have been teaching with it between two and four years (57.1%). Six schools (17.1%) reported using webinars to teach for more than four years, and 25.7% have been using it less than two years.

Organization

This section pertains to research question one which examines organizational characteristics of each college or university in the study. Organizational questions were grouped into three sub-categories: organizational climate, organizational planning, and course delivery. The organizational climate section primarily explores administrative characteristics (represented in Table 3). The planning category is intended to identify whether instructional technology strategy is derived from a centralized, or de-centralized, method and is summarized in Table 4. Course delivery is a measure of the adoption of online learning paradigms relative to traditional methods.

Organizational Climate

Half of the respondents felt that their institution put a high priority on providing fully online courses (24.1% agree, 25.9% strongly agree) and about one third did not (31.5% disagree, 1.9% strongly disagree). Nine respondents (16.7%) neither agreed nor disagreed with this statement. A total of nine respondents (5.6% disagree and 11.1% neither agreed nor disagreed) did not feel that the administration had a strong commitment to instructional technology. Nearly half (48.1%) agreed with this statement and more than one third (35.2%) strongly agree.

Table 3

Summary of Organizational Climate Factors

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	No Response
High institutional priority on providing fully online courses	1.9%	31.5%	16.7%	24.1%	25.9%	
Strong administrative commitment to instructional technology	0.0%	5.6%	11.1%	48.1%	35.2%	
Insufficient funds to support online learning	9.3%	33.3%	24.1%	20.4%	13.0%	
Students show little interest in online courses.	27.8%	53.7%	16.7%	1.9%	0.0%	
Upgrading equipment, software & infrastructure is a high institutional priority	0.0%	13.0%	11.1%	48.1%	27.8%	
The administration has unrealistic goals about adapting traditional courses to online delivery	7.4%	50.0%	13.0%	25.9%	3.7%	

Funding is an area that draws nearly balanced responses from the subject pool. Participants were asked whether their institution has insufficient funds to support online learning. About a quarter neither agreed nor disagreed (24.1%), one third agreed and agreed strongly with this statement (20.4% and 13%), while another third disagreed and disagreed strongly (33.3% and 9.3%).

Respondents were asked whether students showed little interest in online courses. One respondent agreed, another 16.7% were, and the majority felt that their students are interested in online courses (53.7% disagree and 27.8% strongly disagree).

Three quarters of participants indicated that their institution gives a high priority to upgrading equipment, software and infrastructure (48.1% agree, 27.8% strongly agree). Six respondents (11.1%) neither agreed nor disagreed, and 13% disagree with this statement.

Nearly a third (25.9%, and another 3.7% strongly) felt that their school's administration has unrealistic goals about adapting traditional courses to online delivery. Exactly half (50%) disagreed with this statement, and another 7.4% strongly disagreed. Seven respondents (13%) were neither agreed nor disagreed.

Organizational Planning

Participants were asked: which members of the following list have significant input into long-range instructional technology planning at their institution. Table 4 provides the complete range of responses. Nearly every entity on the list was characterized as having significant input by at least three quarters of participants; however, student advisory boards were not considered to have a major role at most institutions. Nearly half of the respondents (40.7%) neither agreed nor disagreed and 29.6% did not indicate a significant role. The remaining 29.7% reported that student advisory boards did play a significant role in long range planning for instructional technology. Also, nearly one third of respondents (18.5% disagree and 11% disagree) indicate that their state or city higher education administration does not play a significant role in the long term instructional technology planning at their institution.

Table 4

Who has Significant Input into Long-Range Instructional Technology Planning

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	No Response
Department chairs and college deans	1.9%	7.4%	13.0%	51.9%	25.9%	
The Student Advisory Board	7.4%	22.2%	40.7%	24.1%	5.6%	
The President, Vice President, and Provost	0.0%	5.6%	1.9%	31.5%	61.1%	
State Dept. of Higher Ed. / State University System (Note: City for CUNY schools)	11.1%	18.5%	24.1%	24.1%	20.4%	1.9%
Instructional Technology Director / Dean of Instructional Technology, or the designated respondent	1.9%	7.4%	5.6%	35.2%	50.0%	
The Information Technology Department managers	0.0%	5.6%	7.4%	53.7%	33.3%	
Instructional design staff	1.9%	11.1%	11.1%	24.1%	50.0%	1.9%
Faculty	3.7%	5.6%	14.8%	50.0%	25.9%	
Special committees (online learning, curriculum, etc.)	1.9%	5.5%	11.1%	48.1%	31.5%	1.9%

Course Delivery

Respondents were asked whether their institutions offered four types of course delivery; online, blended/hybrid, web facilitated, and traditional courses. They were read descriptions of these categories that are based on Allen & Seaman's annual Sloan Consortium report (2008) of online learning. The descriptions follow Table 5, which summarizes the data.

Table 5

<i>Course Delivery Formats</i>		
	Yes	No
Online	94.4%	5.5%
Blended / Hybrid	90.7%	9.3%
Web Facilitated	98.1%	1.9%
Traditional	94.4%	5.5%

Online courses have been defined as those classes in which 80% or more of coursework is delivered online with little, or no, face-to-face meetings. Presently only three of the schools (5.6%) do not offer fully online courses, leaving 94.4% of the subject pool offering online courses.

Blended or Hybrid courses are where 30% to 79% of the coursework is delivered online. This format blends face-to-face meetings and online content delivery to reduce the number of in-person class meetings. Blended or Hybrid courses are offered by 90.7% (49 of 54) of participant institutions.

Web Facilitated courses include between 1% and 29% usage of web-based technology such as course management systems, or web pages to post assignments, documents & syllabi. Web facilitated courses are offered by all but one institution (98.1%).

Traditional courses are where no online technology is used; three schools (5.6%) reported that they do not offer any traditional courses, and 94.4% of the subject pool offer courses with no online technology included in their methods.

Faculty

This section addresses research question two which focuses on faculty characteristics that relate to instructional technology use and webinar adoption. Respondents were asked to provide a general characterization of the faculty at their college or university. A group of questions about instructional technology was used to establish a macro perception of each campus environment based on the respondent's observations of faculty behavior and prevailing faculty attitudes (Table 6). This group of questions was followed by a series of questions based on the adoption-decision process (Rogers, 2003), as observed by the respondent. Table 7 summarizes these characterizations of faculty adoption.

When asked if they felt the faculty had a high interest in using online learning, 13% disagreed and 27.3% were uncommitted. This left 51.9% who agreed and 7.4% who strongly agreed.

Did the respondent feel that their school's faculty has confidence in using instructional technology? One respondent (1.9%) strongly disagreed, 24.1% of respondents disagreed, and 38.9% were uncommitted. Exactly one third (33.3%) agreed that faculty have confidence in using instructional technology, and one respondent (1.9%) strongly agreed.

Table 6

*Summary of Administrators Opinions of
Faculty Characteristics*

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	No Response
There is high faculty interest in adopting online learning.	0.0%	12.7%	27.3%	50.9%	7.3%	
Faculty members are confident in their ability to effectively use instructional technology.	1.9%	24.1%	38.9%	33.3%	1.9%	
Faculty members have a positive opinion about the effects of instructional technology on learning.	0.0%	3.7%	24.1%	59.3%	9.3%	5.6%
Faculty members are confident in available instructional technology.	1.9%	5.6%	18.5%	61.1%	13.0%	
Faculty members are concerned about their intellectual property rights with online content.	0.0%	7.4%	16.4%	33.3%	42.6%	

What was reported by participating administrators about faculty opinions of the effects of instructional technology on learning? Respondents were asked if they felt their faculty held a positive opinion on the effects of instructional technology. Only two (3.8%) disagreed and 25% were uncommitted, 61.5% agreed that their faculty had a positive opinion about the effects of instructional technology, and five respondents (9.6%) strongly agreed.

The next inquiry got more specific. Participants were asked if they felt that their faculties have confidence in the instructional technology that is presently available to them. Nearly three quarters agreed or agreed strongly (61.1% and 13%), ten respondents neither agreed nor disagreed (18.5%), three (5.6%) disagreed, and one (1.9%) strongly disagreed.

Regarding proprietary interests and internet education, participants were asked their opinion of whether their faculty members are concerned about their intellectual property rights with online content. Three quarters affirmed (42.6% strongly agree and 33.3% agree) this belief, while only four (7.4%) respondents disagreed, and nine (16.7%) neither agree nor disagree.

Diffusion theory includes five stages in the innovation-decision process, and it acknowledges that the decision to adopt may later be reversed for a variety of reasons during the implementation phase. A group of four statements was presented to the respondents to find a general impression of adoption levels at each school. The condensed inquiry into adoption asked for administrators' opinions about (a) whether faculty are aware of webinar technology, (b) if the faculty have adopted webinars, (c) whether the faculty advocate webinar technology adoption to their peers, and (d) if adopting faculty have subsequently discontinued webinars use.

Less than two thirds of participating school administrators (33.3% agree, 24.1% strongly agree) felt that their faculty were aware of webinar technology, and close to one third (31.5%) neither agreed nor disagreed. Six respondents (11.1%) did not agree that their faculty were aware of webinar technology. Only eleven participants agree or strongly agree (18.9% and 1.9%) that faculty members have adopted webinars in one or more courses. Nearly two thirds of participating administrators felt their faculty (49.1% disagree and 13/2% strongly disagree) have not adopted webinars, nine respondents (17%) did not agree nor disagree that their school's faculty have adopted webinars in one or more of their courses, and one (1.9%) did not respond.

Slightly less than one quarter (20.8% agree and 2.8% strongly agree) report that they have faculty members who encourage their peers to use webinars, more than half (17% strongly disagree, 35.8% disagree) reporting no advocacy among faculty, nearly one quarter (20.8%) neither agreeing nor disagreeing, and one (1.9%) did not respond. As for subsequent discontinuance of webinars after adoption, six (11.1%) agreed that they had faculty who had adopted web conferencing technology in one or more of their courses but subsequently chose to discontinue its use, two thirds disagree (44%) or strongly disagree (22%) with this statement, eleven respondents (22%) neither agreed nor disagreed, and one (1.9%) did not respond.

Table 7

*Summarized Administrator Opinions of Faculty
Adoption-Decision for Webinars*

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	No Response
Faculty members are aware of web conferencing technology.	0.0%	11.1%	31.5%	33.3%	24.1%	
Faculty members have adopted webinars in one or more of their courses.	13.0%	48.1%	16.7%	18.5%	1.9%	1.9%
Faculty members encourage their peers to use webinars in their courses.	16.7%	35.2%	22.2%	20.4%	3.7%	1.9%
Adopting faculty members have subsequently discontinued webinar use.	20.4%	40.7%	20.4%	11.1%	0.0%	7.4%

Infrastructure

This section pertains to research question three which focuses on the hardware and software used for instructional methods, as well as Internet connectivity. The questionnaire was sub-divided into three sections, and several general questions precede the sub-sections that examine web capability and hardware status. The data are summarized in Tables 8, 9, and 10 respectively.

All of the participating schools use some sort of an online course management system and 72% make webinar software readily available for their professors to use. Two thirds (66.7%) of the institutions reported that their instructor stations are capable of supporting webinars, and nearly as many (64.8%) supply headsets and webcams to instructors, if requested. Some of the respondents who reported not supplying these items stated that such items are distributed on the college or departmental level, and a few others noted that they use Macs and laptops that they felt didn't require peripheral hardware.

Table 8

Available Instructional Technology Hardware

	Yes	No
School uses course / learning management software (CMS/LMS).	100.0%	0.0%
Web conference software is readily available.	72.2%	27.8%
Instructor stations are capable of supporting web conference.	66.7%	33.3%
School supplies webcams, headsets, microphones, etc. to instructors.	64.8%	35.2%

Internet Capability

The sub-section that deals with Internet connectivity is summarized in Table 9. As stated in the literature review, increased data flow capability is a key enabler of webinar adoption. This part of the questionnaire examines the availability of Internet connections throughout each campus, and it looks at available bandwidth on campus, in the local community, and for the school's recruitment region.

Participants were asked if all of the classrooms at their institution have high-speed internet access. Nearly all affirmed (67.9% strongly agree and 20.8% agree), one (1.9%) neither agreed nor disagreed, four disagreed (7.5%), one strongly disagreed (1.9%) and one (1.9%) did not respond.

Participants were asked if the library offers enough high-speed internet access points to meet student demand. More than two thirds strongly agreed (69.8%) twelve (22.2%) agreed; two (3.8%) neither agreed nor disagreed, one (1.9%) disagreed, one (1.9%) strongly disagreed, and one (1.9%) did not respond.

Participants were asked if all dormitories offer students high-speed internet. This statement did not apply to every institution, because some have no dormitories, so there were 46 responses. All but 3 of the schools (82.6% strongly agree and 10.9% agree) report high speed connectivity in all of their dorms.

Participants were asked if all classrooms have internet-capable, multi-media instructor work stations. Two thirds of the school respondents either agreed (37%) or strongly agreed (29.6%). Nearly one quarter of the school respondents did not agree (22.2%, plus 3.7% strongly) and four respondents (7.4%) neither agreed nor disagreed with this statement.

Table 9

Summary of Internet Access Factors

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	No Response
All of the classrooms have high-speed internet access.	1.9%	7.4%	1.9%	20.4%	66.6%	1.9%
The library offers enough high-speed internet access.	1.9%	1.9%	3.7%	22.2%	68.5%	1.9%
All dormitories offer students high-speed internet.	1.9%	0.00%	3.7%	9.3%	70.4%	14.8%
All classrooms have internet-capable, multi-media instructor work stations.	3.7%	22.2%	7.4%	37.0%	29.6%	
All classrooms support wireless internet for student laptop access.	0.0%	16.7%	7.4%	29.6%	46.3%	
The institution provides sufficient internet access points to meet student demand.	1.9%	3.7%	3.7%	44.4%	46.3%	
The institution's network has sufficient bandwidth to support high volume use.	0.0%	3.7%	5.6%	24.1%	66.7%	
Sufficient broadband available within 10 miles of campus	1.9%	7.4%	11.1%	29.6%	50.0%	
Sufficient broadband available within recruitment region	1.9%	7.4%	13.0%	44.4%	31.5%	1.9%

Participants were whether all classrooms have wireless internet that students may access with laptop computers. Three quarters of the sample (46.3% strongly agree and 29.6% agree) indicate that their classrooms have wireless hubs. Nine schools (16.7%) disagreed and four (7.4%) neither agreed nor disagreed.

Participants were asked if the institution provides sufficient internet access points to meet student demand. Nearly all respondents (44.4% agree and 46.3% strongly agree) felt that their campus-wide connectivity meets their students' needs and only three did not (3.7% disagree, 1.9% strongly disagree).

The next three questions examine the actual volume of data flow available on campus, near campus, and within the institution's region of recruitment. This is an important because one aspect of distance learning is its potential to reduce or eliminate student commuting, and webinars can improve online learning interactions. Participants were asked if the institution's network has sufficient bandwidth to support high volume use. All but five agreed with this statement (66.7% strongly agree and 24.1% agree), three (5.6%) neither agreed nor disagreed, and two (3.6%) disagreed.

Participants were asked if a broadband connection that will support web conferencing technology is available within a 10-mile radius of their campus. One respondent (1.9%) strongly disagreed and four others (7.4%) disagreed, six (11.1%) neither agreed nor disagreed, leaving a combined 79.6% estimating the bandwidth available near campus to be sufficient for webinars (29.6% agree and 50% strongly agree).

Participants were asked if a broadband connection sufficient to support web conferencing technology is available in the school's recruitment region. Three quarters of respondents (44.4%

agree and 31.5% strongly agree) estimated that there is sufficient bandwidth within their recruitment region, and one institution (1.9%) out of 54 did not respond.

Hardware Status

The next group of statements referred to each institution's equipment and its upkeep (Table 10). When asked whether any components are missing nearly three quarters (35% agreed and 37% strongly agreed) indicated that their institution has the equipment in place to support webinars. Six (11.1%) neither agreed nor disagreed, and 13% disagreed or 3.7% strongly disagreed that everything was in place for professors to use webinars at their school.

The next question asked if the quality of equipment is at a desirable level to support web conferencing. Four out of five responded affirmatively (38/9% agree, 40.7% strongly agree), four respondents (7.4%) neither agreed nor disagreed, and a total of seven participants (13%) disagreed.

Slightly more than half (33.3% agree, 20.4% strongly agree) of respondents indicating that their institution has enough equipment to support webinars, 20.4% neither agreed nor disagreed, and 26% of the respondents felt their institution had an insufficient quantity of equipment available to support webinars.

Almost eighty-one percent of the school representatives indicated that the existing equipment meets or exceeds current standards for webinars (56.6% agree, 24.5% strongly agree). Five respondents (9.4%) disagree, and another five (9.4%) neither agreed nor disagreed.

Participants were asked whether the institution's network is sufficiently maintained. Only two disagreed (3.7%) and one participant neither agreed nor disagreed (1.9%).which leaves nearly all institutional networks properly maintained (37% agree, 57% strongly agree).

A similar characterization of hardware maintenance was found. All but four respondents (1.9% disagree, 5.6% neither agreed nor disagreed) indicated that their institution's computer work stations, access points, and wireless hubs are sufficiently maintained (42.6% agree, 59% strongly agree).

Table 10

Summary of Instructional Technology Hardware

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	No Response
No equipment required for web conferencing is missing.	3.7%	13.0%	11.1%	37.0%	35.2%	
Quality of equipment can support web conferencing.	1.9%	11.1%	7.4%	38.9%	40.7%	
Sufficient quantity of equipment to support web conferencing.	1.9%	24.1%	20.4%	33.3%	20.4%	
Equipment meets or exceeds current standards for web conferencing.	0.0%	9.3%	9.3%	55.6%	24.1%	1.9%
The network and servers are sufficiently maintained.	0.0%	3.7%	1.9%	37.0%	54.0%	
Computer work stations, access points, and wireless hubs are sufficiently maintained.	0.0%	1.9%	5.6%	42.6%	50.0%	

Technical Support

This section deals with research question four which examines instructional technology support including help desk operations; professional development and course development support; and student, faculty, and staff perceptions of technical support for instructional technology. Responses from Likert scale statements are summarized in Table 11.

Respondents were asked whether their time is totally devoted to Instructional Technology support. Three quarters (46.3% strongly agree and 33.3% agree) indicated that their responsibilities are not exclusively focused on instructional technology, 11% neither agreed nor disagreed, and only five participants (9.3%) characterized their job as exclusively focused on instructional technology.

Exactly half of the participants (31.5% agree, 18.5% strongly agree) felt that budgetary policies limit instructional technology funding at their institution, one third disagree (20.4% and 13% strongly), and 16.7% neither agreed nor disagreed with this question.

More than half (29.6% agree, 24.1% strongly agree) indicated a high reliance on student workers for daily instructional technology support operations, such as help desk and troubleshooting. More than one third (20.4% disagree, 14.8% strongly disagree) of participating institutions do not rely heavily on student workers for tech support, and the remaining six respondents (11.1%) neither agreed nor disagreed.

Participants were equally divided when asked whether their departments include enough professional staff to train faculty to use instructional technology. Those who felt understaffed (14.8% strongly disagree, 25.9% disagree) were balanced with those who believe that they have sufficient personnel (31.5% agree, 11.1% strongly agree) to meet the instructional technology training requirements for their institution.

Table11

Summary of Responses to Technical Support Statements

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	No Response
Respondent's time is totally devoted to instructional technology support.	46.3%	33.3%	11.1%	9.3%	0.0%	
Budgetary policies limit inst. tech. funding.	13.0%	20.4%	16.7%	31.5%	18.5%	
High reliance on student workers for IT support.	14.8%	20.4%	11.1%	29.6%	24.1%	
Department has enough professional staff to train faculty to use instructional technology.	14.8%	25.9%	16.7%	31.5%	11.1%	
Sufficient staff to meet present and projected content adaptation demands.	18.5%	40.7%	18.5%	18.5%	3.7%	
Help desk hours meets institutional demands.	5.6%	25.9%	7.4%	51.9%	9.3%	
Students are satisfied with technical support.	0.0%	16.7%	11.1%	66.7%	5.6%	
Faculty and staff are satisfied with tech. support.	1.9%	9.3%	9.3%	68.5%	11.1%	
Faculty are satisfied with professional development for using inst. tech.	1.9%	11.1%	24.1%	51.9%	11.1%	
Faculty are satisfied with online course development and adaptation support.	1.9%	13.0%	16.7%	57.4%	11.1%	

This distribution does not hold true for instructional designers. Less than one fourth of the respondents (18.5% agree and 3.7% strongly agree) felt that the number of professional staff available to assist faculty with course content adaptation meets present and projected demands. Nearly two thirds (40.7% disagree, 18.5% strongly disagree) indicate a shortage of instructional designers, and 18.5% neither agreed nor disagreed.

Participants were asked whether their help desk hours of operation meet institutional demands. Almost one third (25.9 disagree, 5.6% strongly) felt that there is a shortfall, a few (7.4%) neither agreed nor disagreed, and a majority (51.9% agree, 9.3% strongly) reported that this aspect of support is sufficiently covered.

The final four questions examined satisfaction with technical support. Only 16.7% felt that students were not satisfied with the department's ability to rectify technical problems and help them with troubleshooting. Most participants (66.7% agree, 5.6% strongly) responded favorably and 9.3% neither agreed nor disagreed. Even more (68.5% agree, 11.1% strongly) felt the faculty and staff are satisfied with their ability to rectify technical problems and help them with troubleshooting. There were five respondents (9.3%) that neither agreed nor disagreed, 9.3% disagreed, and 1/9% strongly disagreed.

The participants were also asked to provide their perception of faculty satisfaction with training and course development. Nearly two thirds (51.9% agree, 11.1% strongly) felt that faculty members are satisfied with the professional development programs for using instructional technology, but another quarter (24.1%) neither agreed nor disagreed. A total of 13% disagreed (only 1.9% strongly) on this subject. Finally, respondents were asked whether faculty members are satisfied with their ability to meet online course development or course adaptation needs.

More than two thirds (57.4% agree, 11.1% strongly) indicated their belief that their efforts have satisfied their school's faculty, 14.9% disagreed, and 16.7 neither agreed nor disagreed.

Faculty Interest and Adoption

Research question five examines the relationship between participating administrator's opinions of faculty interest in instructional technology and webinar technology adoption.

Comparative measures were used to answer this question. Simple correlations examine general institutional information and faculty interest and confidence in using instructional technology.

This was followed by exploratory factor analysis and correlation of the identified factors with three dependent variables related to faculty adoption of webinars.

Correlations

Fifty-one scale variables were cross-correlated using the Spearman Rho correlation coefficient. Findings for the general demographic data are described in this section, with the correlation coefficient (r_s) and levels of significance for each. Correlation tables for the independent variable *enrollment* and several faculty attitudes are presented and discussed. A discussion of significant correlations with the dependent variable *webinars adoption* closes this section.

Total enrollment correlates with moderate strength to a range of variables, summarized in Table 12. The strongest correlations are the two variables that measure whether there are sufficient instructional technology staff for training and course adaptation; these are also highly significant ($p = .001$). Negative correlations are indicated for faculty awareness of webinars, school budgetary policies limiting instructional technology funding, and whether instructional and information technology staff have significant input into the institution's long range instructional technology plan. The enrollment variable also correlates with the institution's

prioritization of instructional technology upgrades, available online learning funds, administrative commitment to instructional technology, and whether the administration has realistic goals regarding the development and adaptation of courses for online delivery.

Table 12

Ranked Variable Correlations with Enrollment

	Correlation Coefficient (r_s)	Sig. (2-tailed)
Sufficient instructional technology staff to meet training needs	.433	.001
Sufficient instructional designers to help adapt courses to online delivery	.422	.001
Faculty are aware of web conferencing	-.340	.012
Instructional technology upgrades are a high institutional priority	.305	.025
Few funds available for online learning	.301	.027
School budgetary policies limit instructional technology funding	-.280	.040
Strong administrative commitment to instructional technology	.271	.047
Significant planning input from Inst /Info Tech managers	-.271	.048
Realistic administrative goals for adopting courses to online delivery	.269	.049

The reported length of time webinars have been in use at each institution has a moderately strong correlation with instructional design staff input into long-range planning ($r_s = .422$, Sig = .013), the number of available instructional designers ($r_s = .336$, Sig = .042), and whether the respondent works exclusively in instructional technology ($r_s = .345$, Sig = .048).

Faculty interest in using online education methods shows a moderately strong correlation with institutional priorities for offering online courses (Table 13). Long-range planning input from an external education system and student interest in online courses both correlate to faculty interest with moderate strength. The institutional priority on instructional technology upgrades and faculty confidence in available instructional technology both correlate with faculty interest in adopting online teaching methods with moderately weak strength.

Table 13

Ranked Faculty Interest in Adopting Online Learning

	Correlation Coefficient (r_s)	Sig. (2-tailed)
Institution prioritizes offering online courses	.482	.000
Significant planning input from state, city or other higher education system	.432	.001
High student interest in online courses	.390	.004
Instructional technology upgrades are a high institutional priority	.275	.044
High faculty confidence in the instructional technology available	.273	.045

The last correlation in Table 13 links faculty confidence with available instructional technology with their interest in online learning. Sixteen variables correlate to faculty confidence with instructional technology use. Table 14 shows a moderately high-strength relationship between confidence in technology use and confidence in available technology, six other relationships have significance levels better than $p = .01$, and nine more variables show moderate strength correlations of significance ($p = .05$).

Table 14

Ranked Faculty Confidence in Using Instructional Technology

	Correlation Coefficient (r_s)	Sig. (2-tailed)
High faculty confidence in the instructional technology available	.488	.000
High student satisfaction with technical support	.432	.001
Equipment can support webinars	.420	.002
Equipment meets or exceeds web conference standards	.411	.002
High faculty opinion of instructional technology's positive effects on learning	.404	.003
All classrooms have Internet-capable, multi-media instructor stations	.359	.008
Funds available for online learning	.349	.010
Significant planning input from special purpose committees	.348	.011
Web conference components missing	.342	.011
High Faculty satisfaction with inst tech training	.331	.014
The institution's hubs, work stations & access points are sufficiently maintained.	.328	.016
Sufficient quantity of equipment to support webinars	.321	.018
Significant planning input from state, city or other higher education system	.320	.019
The institution's network has sufficient bandwidth.	.317	.019
Instructional tech upgrades are a high institutional priority.	.292	.032
Significant planning input from a student advisory board	.271	.048

Correlations of variables with faculty opinions regarding the effectiveness of instructional technology are summarized in Table 15. All relationships are moderate to moderately weak, and there appear to be both intrinsic and extrinsic influences on these opinions. The external influences are related to organizational factors and their institution's infrastructure.

Table 15

Ranked Positive Faculty Opinions About the Effects of Instructional Technology

	Correlation Coefficient (r_s)	Sig. (2-tailed)
High faculty confidence with using instructional technology	.404	.003
High faculty confidence in the instructional technology available	.344	.013
Institution prioritizes offering online courses	.316	.022
All dormitories have high speed Internet	.309	.041
Significant planning input from state, city or other higher education system	.279	.047

There is some overlap of the variables that correlate with faculty confidence in using instructional technology and faculty confidence with the technology that is available to them. Table 16 summarizes the correlations for faculty confidence with their available technology. The following discussion will note those variables that were not present in the table for confidence with using technology.

Table 16

Ranked Faculty Confidence in Available Instructional Technology

	Correlation Coefficient (r_s)	Sig. (2-tailed)
The institution's hubs, work stations & access points are sufficiently maintained.	.491	.000
High faculty confidence with using instructional technology	.488	.000
High faculty & staff satisfaction with technical support	.437	.001
Equipment can support webinars.	.382	.004
Instructional technology upgrades are a high institutional priority.	.381	.004
High student satisfaction with technical support	.374	.005
Equipment meets or exceeds web conference standards.	.364	.007
Sufficient quantity of equipment to support webinars	.358	.008
Institution prioritizes offering online courses.	.348	.010
High faculty opinion about the positive effects of instructional technology on learning	.344	.013
Sufficient instructional designers to help adapt courses to online delivery	.312	.021
Sufficient inst. technology staff to meet training needs	.294	.031
High Faculty satisfaction with course design / adaptation support	.293	.031
High faculty satisfaction with inst tech training	.283	.038
High faculty interest in adopting online learning	.273	.045
Web conference components missing	.270	.048
The institution's network is sufficiently maintained.	.269	.049

High faculty satisfaction with technical support and institutional prioritization of delivering online courses are both moderate relationships with ($p = .01$). Five more variables that appear on this table that do not appear on Table 14 are; sufficient staff for instructional designer support, sufficient staff for technical training, faculty satisfaction with instructional design support, faculty interest in using online learning, and maintenance of the institution's network. All have a moderate strength relationship with faculty confidence in the available technology.

Variables that did not significantly correlate with faculty confidence in available technology (but correlated with confidence in technology usage) are; classrooms with Internet-capable work stations for professors, availability of online learning funds, institutional bandwidth, planning input from special purpose committees, an educational system (state, city, or other), and student advisory board input into long-range planning.

The correlations matrix that was created for this phase of the data analysis indicates only two independent variable relationships with the dependent variable *faculty has adopted webinar*. The independent variable *faculty advocate webinar* has a strong correlation with the dependent variable ($r_s = .654$, Sig. .000), and this would seem to indicate that the organizational adoption champion (Rogers, 2003) is a key factor in webinars diffusion at higher education institutions. A relationship of moderate strength ($r_s = .305$, Sig. .031) is indicated between the dependent variable and the independent variable *faculty have discontinued using webinars*.

Factor Analysis

Thirteen composite measures were initially identified using exploratory factor analysis of 47 independent variables. Principle component extraction was used with varimax rotation and

Kaiser Normalization. A component matrix indicates that these measures combine to account for 88.4% of variations in the dependent variables for this study.

Factor loadings were analyzed from the rotated component matrix. Items (variables) were retained on a factor using the .60 / .40 criterion recommended by McCroskey and Young (1979). Items failed to load on a factor if their weight was not above .60; any item that initially appeared to load based on this criterion was subsequently removed from the construct if it showed a secondary loading greater than .40 on any of the other factors. This process reduced the total number of factors to eleven, and the load analysis identified three instances where only a single variable loaded above .60, so these are actually single variables.

Each of the eight composite measures is described in the following section and shows which variables loaded on each, as well as the percent of variance that may be attributed to it. The percentages given are post-rotation sums of squared loadings. The three stand-alone variables also are described in similar fashion. A reliability check for the eight composite factors was made using Cronbach's Alpha to check inter-item correlations for these indexes; this value is also presented and it is characterized (fair reliability, good reliability, highly reliable) based on a scale offered by Reinard (2006).

The first measure accounts for 9.4% of variance, and it is comprised entirely of organizational planning variables (Table 17). Three variables that load on this measure relate to which entities have significant input on long-term instructional technology planning. They are special purpose committees, faculty, and student advisory boards, so the measure was named *PlanInput*. Reliability testing indicated a Cronbach Alpha of .786 which may be considered fairly reliable. Removing the *student advisory board* variable increases this composite's reliability ($\alpha = .877$).

Table 17

Rotated Load Matrix, Components 1-3

	Component		
	PlanInput	OrgPlnOpInt	Access
Variance	9.4%	9.1%	8.9%
	$\alpha = .877$	$\alpha = .680$	$\alpha = .735$
Loaded Variable ¹			
High faculty interest in using online learning	-.247	.702	-.044
High faculty opinion about the positive effects of instructional technology	.220	.793	-.059
All Classrooms have Internet-capable, multi-media instructor stations	.226	.035	.657
All classrooms have wireless hubs for student laptop access	-.059	-.033	.894
Sufficient Internet access throughout campus	.044	.056	.774
Institution prioritizes offering online courses.	.186	.687	.145
Significant planning input from a student advisory board	.637	-.095	.028
Significant planning input from state, city or other higher education system	-.148	.829	-.003
Significant planning input from the faculty	.875	-.122	.096
Significant planning input from special purpose committees	.904	.095	.071

¹Bold indicates that the variable is loaded on the factor.

The second measure accounts for 9.1% of variance; and it combines faculty attitude variables with organizational planning variables (Table 17). The variables that load on this measure are significant planning input from an external educational system, faculty opinions

regarding instructional technology effects, faculty interest in using online learning, and an institutional emphasis on offering online courses. Reliability testing indicated a marginally reliable Cronbach Alpha of .680. Since it combines institutional planning with faculty attitudes, it had been named *OrgplnFacatt* in SPSS.

The third measure accounts for 8.9% of variance (Table 17). The variables that load on this measure deal primarily with infrastructure. Wireless hubs in the classroom, student access throughout campus, and Internet-capable instructor work stations load cleanly here, so this measure has been named *Access*. Testing indicated a fairly reliable Cronbach Alpha ($\alpha = .735$).

The fourth measure accounts for 8.8% of variance, and it focuses on other dimensions of infrastructure (Table 18). The variables that load on this measure are maintenance of the institution's network; maintenance of wireless hubs, work stations, and Internet access points; whether the institution's respondent holds an exclusively instructional technology position; and whether equipment meets webinar standards. This measure was named *MntStd*, and its reliability rating is improved to $\alpha = .814$ (from $\alpha = .776$) with the removal of the variable *respondent's position deals exclusively with instructional technology*.

The fifth measure accounts for 7.7% of variance (Table 18). The variables related to faculty satisfaction with course design support and faculty satisfaction with instructional technology training load on this measure, so it was named *FacSat*. Its reliability coefficient (.857) is good.

Table 18

Rotated Load Matrix, Components 4-6

	Component		
	MntExclStd	FacSat	Staff
	Variance		
	8.8%	7.7%	6.9%
	$\alpha = .776$	$\alpha = .857$	$\alpha = .834$
Loaded Variable ¹			
Equipment meets or exceeds web conference standards	.690	-.020	.211
The institution's network is sufficiently maintained.	.911	.089	.076
The institution's hubs, work stations & access points are sufficiently maintained.	.784	.139	.057
Strong administrative commitment to instructional technology	.092	.163	.648
The respondent's job is exclusively instructional technology.	.700	-.029	.115
Sufficient instructional technology staff to meet training needs	.106	.063	.875
Sufficient instructional designers to help adapt courses to online delivery	.159	.166	.895
High faculty satisfaction with instructional technology training	.004	.836	.111
High faculty satisfaction with course design / adaptation support	.289	.872	.135

¹Bold indicates that the variable is loaded on the factor.

The sixth measure which deals with technical support accounts for 6.9% of variance (Table 18). The variables that load on this measure are sufficient instructional designers for course development and sufficient training staff to meet the institution's needs. A strong administrative commitment to instructional technology also weighs significantly on this measure; however this construct is more reliable without the administrative commitment variable (Cronbach's Alpha is .834 rather than .795). Therefore, only the two staff support variables were retained, and this measure was named *Stafft*.

The seventh measure accounts for 6.3% of variance, and it examines the hardware aspect of infrastructure (Table 19). It combines the variables existing equipment can support webinars with missing webinar equipment, and this construct was named *Equipt*. Cronbach's Alpha testing indicates that this measure has good reliability ($\alpha = .868$).

Table 19

Rotated Load Matrix, Components 7 & 8

	Component	
	Equipt	OCBand
Variance	6.3%	5.8%
	$\alpha = .868$	$\alpha = .842$
Loaded Variable ¹		
Sufficient bandwidth available within 10 miles	-.154	.795
Sufficient bandwidth available in recruitment region	-.067	.878
Web conference components missing	.699	-.009
Equipment can support webinars	.808	-.206

¹Bold indicates that the variable is loaded on the factor.

The eighth measure also deals with infrastructure, and it accounts for 5.8% of variance (Table 19). The sufficient bandwidth variables (off campus and within the school's recruitment region) load on this measure, although network bandwidth does not load cleanly on this or any other factor. This measure, named *OCBand*, has good reliability (Alpha = .842).

The ninth measure accounts for 5.4% of variance, it deals with organizational variables, and features two negative correlations as its heaviest loaded variables. The variable named a high reliance on students to staff the help desk (-.747) combined with the institution's budgetary policies restrict the funding to instructional technology (-.736). This construct has been named *BugStdHD*; however, its poor Cronbach's Alpha coefficient (.433) requires that it be discarded in further data analysis.

The tenth measure accounts for 5.4% of variance and relates to infrastructure, although only one variable, high speed internet in the library loads cleanly on this measure (Table 20). This variable does not correlate significantly with the dependent variable; however, this variable has highly significant correlations ($p = .01$) with other measures of campus internet access and with the institution's network capacity (Table 17). It also relates significantly ($p = .05$) with equipment meeting webinar standards ($r_s = .329$).

The eleventh measure accounts for 5.4% of variance. Variables that load on this measure are that all dormitories have high speed internet and significant instructional planning input from the instructional design staff. However, this construct (*DormIDstf*) only generates an Alpha coefficient of .428, so this has been discarded.

Table 20

*Rotated Load Matrix, Components 10, 12,
and 13*

	Component		
	10 Var	12 Var	13 Var
Variance	5.4%	4.8%	4.4%
	$\alpha =$	$\alpha =$	$\alpha =$
Loaded Variable ¹			
Library has high speed Internet	.904	.068	.020
High student interest in online courses	.165	.853	.133
Realistic Admin goals for adapting courses to online delivery	.056	.089	.915

¹Bold indicates that the variable is loaded on the factor.

The twelfth measure accounts for 4.8% of variance (Table 20). The variable: high student interest in online courses loads on this measure. This variable does not correlate significantly with the dependent variable; however, it has highly significant ($p = .01$) relationships with whether faculty discontinue webinar use ($r_s = -.363$) and faculty interest in online learning ($r_s = .390$), as well as significant ($p = .01$) correlation with sufficient bandwidth in the school's recruitment region ($r_s = .272$)

The thirteenth measure accounts for 4.4% of variance (Table 20). A single variable, whether administrators have realistic goals for adapting courses to online delivery, loads on this measure. This variable does not correlate significantly with the dependent variable; however, it has many significant correlations with underlying variables.

After eliminating two factors due to poor reliability coefficients, the eleven measures identified through factor analysis may be used to account for 77.6% of variance in webinars adoption with less than five percent risk of error. Four fifths of this variance can be predicted

using the eight construct variables (73%) with the remainder attributable to the three single variables (14.6%) that were identified in this process. This analysis provides useful direction for those who want to consider what may influence webinars adoption (and instructional technology in general) by pointing to a manageable number of factors. These account for nearly 80% of a complex combination of institutional and human variables.

CHAPTER 5 DISCUSSION

Summary

The objective of the research study was to identify institutional factors that would impact adoption of webinars as a course delivery method in higher education. This was accomplished by interviewing senior instructional technology administrators at colleges and universities in a geographic region of the United States. A total of 57 colleges and universities were identified as the subject pool, and interviews were completed with 54 of these institutions for a response rate of 94.7%, resulting in a census of the subject population. A questionnaire was developed for this study (“Institutional Factors That Impact Webinar Adoption”, Appendix B) to provide structure to these interviews and to answer the research questions.

All participants were interested in the findings of this research and were offered a copy of the results. As senior technology administrators, each participant offered a macro perspective of the implementation of, and planning for, instructional technology usage. Each of these individuals participated willingly in the twenty- to thirty-minute telephone interviews

Limitations

This study captured the present status of instructional technology use among the participating institutions, as reported by those schools’ directors of instructional technology or information technology.

Since faculty characteristics were based on interview responses made by directors of instructional technology or information technology from the participating institutions, data was not directly collected that reflects faculty attitudes toward online learning, instructional technology, or their adoption and implementation of webinar technology in their course designs.

The potential for self-report bias exists in this study. Reporter bias is a common concern for survey research (Berger, 2000; Buddenbaum & Novak, 2001). It is recognized that bias might appear as positive responses to questionnaire items that refer to organizational, infrastructure, and technical support factors due to the respondent's professional position at their institution.

This study did not address whether collective bargaining and the influence of educator unions could impact the adoption-decision process and faculty implementation of webinars.

Organizational culture within and among academic disciplines was not addressed in this study. For example, no consideration was given to whether attitudes toward instructional technology and online education are different for natural science faculty members when compared with professors of humanities, social sciences, fine arts, or education.

Delimitations

A number of parameters define the boundaries of this research, most of which are stratifications of the subject pool. This study includes only one geographic region of the United States. The primary focus of this study is on the factors that may impact whether professors adopt webinar technology to teach undergraduate and graduate students. This study does not include colleges or universities characterized as research intensive institutions by the Carnegie Classification Index. Also excluded are community colleges, trade schools, four-year colleges, and institutions that grant few, or no, masters' degrees. This study is delimited to profile instructional technology infrastructure in higher education. The policies of elementary or secondary education do not fall within the scope of this inquiry. Professional development programs, which are aimed at professors, librarians, administrators, and institutional staff, are not examined in this research.

Conclusions

Research Question One

The first research question examines the organizational factors that may support college and university use of webinar classrooms. The organizational climate appears to support instructional technology and online learning, although funds to support online learning could be an institutional issue, particularly with smaller enrollments. Two organizational factors have been identified that can impact webinar adoption.

The first organizational factor was identified as a single variable (responses to a lone questionnaire item). Participants were asked whether the upper-level administration at their institution had realistic goals about developing online courses or the adaptation of existing courses to online delivery. This factor correlates with a range of instructional technology issues, from missing webinar components and online learning funds, to high-speed internet in the dormitories and help desk availability. This factor's relationship with the number of instructional design staff for online course development is important. Yoshimura (2008) has suggested that corporate influence in proprietary online universities leads to unrealistic administrative goals; however, fewer than 30% of respondents in my study felt their institution's administrative goals for online course development are unrealistic.

The second organizational factor to be identified by this study relates to long term planning for instructional technology. The input of special purpose committees and the institution's faculty are the key aspects of this factor, and their influence can impact whether webinars are used to deliver coursework. There is a relationship between these two variables (faculty and special purpose committee input) and faculty awareness of webinars, and this

awareness appears to be most strongly influenced by planning input from college deans and departmental chairs. This factor is an indicator of end-user response to organizational direction.

Since nearly all of the participating schools have online (94.5%) and hybrid courses (90.7%) it is fair to suggest that two keys to webinar adoption among these institutions are realistic course development expectations and informed long range planning. Rogers (2003) has observed that larger organizations can be more innovative. While funding is one aspect of this phenomenon that leads to increased infrastructure and staff, organizational innovativeness also reflects a style of institutional decision making; centralized leadership may encourage awareness of an innovation, yet adopter feedback influences its implementation. Larger, more innovative organizations have more *slack resources*, “the degree to which an organization has more resources than those required for its ongoing operations” (ibid., p. 411). Thus, members have opportunities to experiment with various implementations of an innovation, and the results of such testing with webinars could be reported during technology planning meetings.

Research Question Two

The second research question asked about faculty characteristics that impact college and university use of webinar classrooms for delivering coursework. The data for this question was not collected from individual faculty members; it came from reports made by participating administrators about their opinions of the faculty at their respective institution. Three factors were identified that could show faculty impact on webinar adoption. Additionally, there are correlations that should be considered in the data regarding administrator opinions about faculty use of instructional technology and adoption of webinars.

The first factor identified for faculty adoption of webinars illustrates the relationship between organizational input and faculty attitudes. This factor combines administrator reports of

faculty interest in online learning and their opinions about instructional technology effectiveness with the planning influence from their institution's educational system and their school's emphasis on providing online courses. It is a complex measure of intrinsic faculty values and extrinsic influences, and these relationships will impact faculty adoption of webinars.

A second factor for adoption of webinars combines administrator reports of faculty satisfaction with both course design support and the amount of professional development with using instructional technology that is provided by the institution. This indicates a need for more instructional designers in higher education. It also showed that faculty confidence with instructional technology is related to technical support and infrastructure which are best developed through training (Johnson, et al., 2010; Levinsen, 2007). For example, this study indicates that just more than one third of faculties in all the institutions surveyed are confident in their ability to use instructional technology; yet nearly two thirds are confident in the technology that is available to them. This data appears in the same environments where more than half (58.2%) of the institutional administrators felt that their faculty are interested in adopting online learning methods and over two thirds (68.6%) report that their faculties have a positive opinion about the effects of instructional technology on learning.

A third factor for faculty adoption of webinars indicates that faculty attitudes are externally influenced. The level of student interest in online courses correlates with faculty interest in online learning (Table 13), and there is a negative correlation ($r_s = -.363$, $p = .01$) between student interest in online courses with whether professors would discontinue webinars once this course delivery method has been implemented. Student interest in online learning is influential in faculty use of webinars. Other variables that correlate with whether faculty may discontinue webinars relate to existing infrastructure and technical support.

This study also looked at the adoption-decision process for webinars (Rogers, 2003). Although awareness of webinar technology appears in more than half of the surveyed schools, adoption is low (less than one in five schools). A similar lack of faculty advocacy for webinars has also been shown. It can be inferred that the process has not yet moved much beyond the stage of *early adopters* in the diffusion model, which accounts for only 15% of a given population, and this is due to the presence of advocates (opinion leaders, organizational champions) in the data.

In sum, there are external influences and intrinsic motivations for faculty adoption of webinars. It appears that increased training and course development support could contribute to an increase in, and more effective use of, instructional technology, which coincides with the findings of Yakel and Lamberski (2000). Thus, more early adopters of webinar technology would emerge leading to more individual opinion leaders teaching with webinars, and more instructional designers using webinar technology would yield an increase of organizational champions.

Research Question Three

The third research question examined the instructional technology infrastructure that could support college and university use of webinars. The questionnaire examined the hardware available, Internet connectivity, and institutional upkeep of existing infrastructure. A total of five factors of college or university infrastructure were identified to assess institutional readiness for webinars.

There are indications that these aspects of instructional technology are presently in place throughout the sampled institutions, although one quarter of the schools do not have online instructor work stations throughout campus, and 16.7% indicated that their classrooms do not

have wireless hubs for student laptops. All of the schools use some type of learning management system, and webinar technology is readily available at nearly three quarters of the schools. Two thirds of instructor stations are Internet-capable, and nearly as many of the schools supply professors with webcams, microphones, and headsets, where needed. Respondents usually specified whether the webcams, etc. were provided at the institutional level or from a professor's department.

The first infrastructure factor to be identified combines student Internet access via classroom wireless connections, Internet access throughout their campuses, and the availability of online, multi-media instructor work stations. These measures indicate a college or university's preparedness for webinar technology. An institution's Internet access is also addressed by the following factors that are independently measured, and each factor can impact whether a school may be technologically ready to implement webinars for online learning.

The second factor measures whether broadband Internet access is available within ten miles of campus, and within the school's recruitment region. The logistical advantage of webinars relies on geographically dispersed attendees (Abate, 2008; Cobbeth & Hanman, 2009; MacVarnish, Moultrup, & Ward, 2009). This factor can help determine the true effectiveness of using webinars for online distance education since there is significantly less economic advantage for learners that commute more than a few miles for class meetings.

A third connectivity factor was identified. A single variable from the questionnaire, Internet access from the library, was measured. This measure correlates highly with most other measures of the institutional network, and it specifically addresses the school's available bandwidth. It is critical to know whether a school's network is capable of carrying high volume data transfer, especially as webinars require a significant flow rate to operate effectively. The

learning experience can be significantly reduced when sporadic data transmissions create cognitive noise for learners through interruptions of the educational message.

Two other infrastructure factors were identified, both of which deal with the hardware. The first of these looks at maintenance of the institution's network, its wireless hubs, its work stations, and its access points, combined with whether the available hardware meets the standards for webinars. The other hardware factor examined if the available equipment can support webinars, or whether some of the equipment may be missing. An interesting note from the hardware data indicates that just over half of the subject institution respondents felt they had a sufficient quantity of equipment to support webinars.

This study has met the goals of research question three. Several key measures for Internet connectivity have been identified along with two measures of hardware maintenance and equipment quality. The data reported by respondents indicates sufficient connectivity, on and off campus, and hardware capable of handling webinars. It also suggests that organizational funding affects the amount of instructional technology equipment that is available.

Research Question Four

The fourth research question concerns the technical support that is available to promote college and university use of webinar classrooms. A single factor was identified for this category. This factor combines the questionnaire items that measure whether there are sufficient instructional designers for course adaptation with whether instructional technology training needs can be met with existing staff. Yakel and Lamberski (2000) assert that human infrastructure - which combines faculty technology competence, training, integration support, and peer mentoring - is as important as technological infrastructure. And Fuller (2000) suggests

that greater faculty skill with instructional technology promotes learner interest in using computer-based learning.

Determining the amount of available instructional design personnel and the number of instructional technology trainers is critical for the implementation of instructional technology, including webinars, for three reasons. First, each of these variables shows moderate correlations with faculty confidence in the available instructional technology. Second, both faculty satisfaction with instructional technology training and satisfaction with course design and adaptation support correlate with faculty awareness of webinar technology. Third, these two variables show strong correlations with administrative commitment to instructional technology. Therefore, this factor can provide a reliable measure of an institution's support of faculty use of instructional technology and its potential for the faculty's adoption of webinars in their courses.

Research Question Five

The fifth research question explores how faculty interest in online learning may impact webinar technology adoption. There is no data to support that a connection exists. Although 58.2% of respondents indicated that they believe their institution's faculties possess a high interest in adopting online learning, Spearman Rho calculations found no significant correlation of faculty interest in online teaching with dependent variables such as faculty awareness of webinar technology, faculty adoption of webinars, or faculty advocacy of webinars among their peers. Additionally, the dependent variable webinars adoption has no correlation with any of the independent variables measured by this study, such as organizational factors or infrastructure. Although this result could be a product of poor questionnaire design, it is just as likely that webinars adoption is not directly impacted by the variables measured by the instrument, or that reliance on administrator opinions of faculty may have confounded data analysis.

Recommendations

There is sufficient infrastructure for faculty members who chose to adopt webinars for use in their courses. It also appears that there is sufficient organizational support of instructional technology among the colleges and universities that were included in this research. Although funding plays a limiting role in technology and support at some schools, it is related to school enrollment. The following recommendations are intended for higher education institutions that want to improve their instructional technology implementations and for those schools that want to expand their online learning options to include webinars for their students.

First, for schools to expand and improve their online learning programs there should be an increased emphasis on instructional design. The literature has shown that development of online learning materials often requires additional time that is not available to professors (Wilhelm & Wilde, 2005), so colleges and universities should add instructional design staff to augment faculty efforts to create the most effective online course materials.

Second, there should also be an increased emphasis on implementing professional development programs that are pedagogically sound. One-shot faculty familiarization meetings should be followed up with practical application exercises and opportunities to assess and develop faculty skills for teaching with instructional technology. Levinsen (2007) has identified consequences to faculty development programs that don't meet institutional needs, and Johnson, et al. (2010) recommend shifting the emphasis of faculty training away from instructional technology familiarization and toward thinking that creatively integrates the technology to reach pedagogical objectives. Klecka, et al. (2005) stress the importance of establishing the attendees' comfort level with the many features and technical requirements of webinar technology. Cook (2009) has noted that participant experiences may be enriched by an instructor who shares their

desktop to demonstrate how to navigate the online learning space. Additionally, Levinsen (2007) notes the importance of placing learners at ease in online learning environments, the distinctly different skills needed to teach there, and studies the effectiveness of training methods.

Third, colleges and universities should give faculty a larger role in long term instructional technology planning. Input from the technology users who interact with learners can lead to informed decision making, attainable institutional goals, empowerment of the faculty voice, and improved adopter buy-in to new instructional technology programs. Such an environment becomes the incubator for opinion leaders and innovation champions.

Fourth, tenure progression paradigms may need to be reconsidered in order to recognize that development of online course materials is a reasonable type of scholarship (essentially another form of media artifact production). This study has found that sufficient technical infrastructure is available for webinars to be used for distance learning, and that organizational support for instructional technology is robust. However, there are no indications of institutional incentives for online learning adoption, and Schneckenberg (2009) has argued that the absence of such incentives may deter instructional technology integration.

Fifth, staff and funding changes should not be made at the expense of infrastructure upgrades and maintenance. The present scenario that may be derived from the data indicates that the infrastructure presently in place is sufficient to support instructional technology growth and the adoption of webinars. Improved use of present technological infrastructure through training should be accompanied by routine upgrades to hardware, software, and connectivity.

Finally, there is a need for faculty to experiment with instructional technology, what Rogers (2003) calls trialability, in order for them to make adoption choices. Allen & Seaman (2008) have noted faculty reluctance toward implementing web teaching methods in general.

Although money has been spent to make webinar technology readily available among 72% of the participating schools only 20% stated that any of their faculties have adopted webinars in any form. The literature has indicated that faculty time for instructional technology exploration is severely limited, and that innovation incentives are not readily available (Schneckenberg, 2009). Adoption of webinars for post-secondary distance learning is thus slowed by the limited opportunity to try its effectiveness.

Recommendations for Future Research

This study was a benchmark for organization diffusion of instructional technology and webinars. There is a need for more studies of this nature, as well as research that targets the perspectives and opinions of faculty. Such research could examine the individual adoption-decision process among professors who choose to adopt webinars.

The instrument developed for this study can be used in several ways. First, it was intended to be used for longitudinal diffusion studies with the same pool of subject institutions. Second, this questionnaire could be administered using the same methodology with other populations; such as other groups of senior instructional technology administrators or a group of faculty. Third, faculty members from the participant institutions could be polled, using this instrument, in order to compare the perspectives.

There is need for research into the pedagogical effectiveness of webinars. Studies of this nature may require the development of specific metrics or the use of existing measures for online learning. This work will result in refining what are currently believed to be “best practices” for business and professional development webinars, and then establishing what works effectively for delivering post-secondary education.

As identified in the review of literature, there exists a need for analysis of the costs of developing online learning programs, course materials and the development of webinars for higher education. Analysis of the costs of course development for webinars can take on several perspectives: 1) what are the costs and benefits of developing the skills of online professors who want to integrate webinars with their pedagogy, 2) what are the costs and benefits involved with having an instructional designer develop online learning materials and webinar-borne instruction, and 3) how could the cost of using an instructional assistant to deliver webinars to college students be accounted for and offset. All of these would need to consider the savings incurred by students and educational institutions, such as reduced need for satellite campuses and learning centers.

Further research might also be conducted that compares synchronous and asynchronous online learning. An experimental design might include synchronous, asynchronous, and in-person courses delivered by the same instructor. Additionally, online learners and faculty who teach over the Internet could be surveyed for their opinions regarding their experiences and preferences, and the results could prove useful to analysis of the diffusion of webinars.

The topic of webinars adoption in higher education might also be investigated through a systems theory perspective rather than diffusion of innovations.

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APPENDIX A

PARTICIPANTS: MASTERS AND DRU MIDDLE EASTERN STATES

DISTRICT of COLUMBIA

1. University of the District of Columbia

DELAWARE

2. Delaware State University

MARYLAND

3. Bowie State University
4. Coppin State University
5. Frostburg State University
6. Morgan State University
7. Salisbury University
8. Towson University
9. University of Baltimore
10. University of Maryland-Eastern Shore
11. University of Maryland-College

NEW JERSEY

12. College of New Jersey, The
13. Kean University
14. Montclair State University
15. New Jersey City University
16. Ramapo College of New Jersey
17. Richard Stockton College of New Jersey, The
18. Rowan University
19. Rutgers University-Camden
20. William Paterson University of New Jersey

NEW YORK

21. CUNY Bernard M Baruch College
22. CUNY Brooklyn College
23. CUNY City College
24. CUNY College of Staten Island
25. CUNY Hunter College
26. CUNY John Jay College Criminal Justice
27. CUNY Lehman College
28. CUNY Queens College
29. SUNY College at Brockport
30. SUNY College at Buffalo

31. SUNY College at Cortland

32. SUNY College at Fredonia

33. SUNY College at Geneseo

34. SUNY College at New Paltz

35. SUNY College at Oneonta

36. SUNY College at Oswego

37. SUNY College at Plattsburgh

38. SUNY Empire State College

39. SUNY Institute of Technology at Utica-Rome

40. SUNY Potsdam

PENNSYLVANIA

41. Bloomsburg University of Pennsylvania

42. California University of Pennsylvania

43. Cheyney University of Pennsylvania

44. Clarion University of Pennsylvania

45. East Stroudsburg University of Pennsylvania

46. Edinboro University of Pennsylvania

47. Indiana University of Pennsylvania-Main Campus

48. Kutztown University of Pennsylvania

49. Lincoln University

50. Lock Haven University of Pennsylvania

51. Mansfield University of Pennsylvania

52. Millersville University of Pennsylvania

53. Pennsylvania State University-Penn St. Great Valley

54. Pennsylvania State University-Penn St. Harrisburg

55. Shippensburg University of Pennsylvania

56. Slippery Rock University of Pennsylvania

57. West Chester University of Pennsylvania

APPENDIX B

INSTITUTIONAL FACTORS THAT IMPACT WEBINAR ADOPTION

Disclosure

You have been asked to participate in a study of the institutional factors that affect adoption of web conferencing technology in higher education. Your institution has been specifically chosen because it falls within regional and academic parameters established by the researchers. Your participation is completely voluntary and you may withdraw from participation at any time without consequence. Your participation in this study will pose minimal risk. Your identity will be kept strictly confidential in all resulting publications. The only compensation that will be provided to participants is a copy of the results of this study.

Purpose

The purpose of this questionnaire is to collect data on the status of webinar adoption in higher education, particularly as a method of course delivery.

Definition

The terms webinar and web conferencing may be used interchangeably during this interview. Webinar is the practice of using web conference software, such as Adobe Meet, Citrix Online, Elluminate Live, or Wimba to gather at an online meeting room.

Who should be completing this questionnaire?

The Dean of Technology, or Director of Instructional Technology, or the day-to-day administrator of instructional technology will be best suited to provide the requested information.

Format of the questionnaire

The questionnaire is broken into four parts that request specific information about your institution in areas of concern to the researchers. These areas of focus are: faculty, infrastructure, organization, and technical support. Most of the questions have been designed to allow you to respond by referencing a traditional, 5-point Likert scale. In some cases you will be asked for simple yes and no responses.

Please respond to all questions and statements as best you can. Our pilot analysis of the instrument shows that the interview can be consistently completed in 20 minutes, should you choose to offer additional qualitative data the time may run longer.

General Information

1. Complete name of college or university: _____
2. Enrollment ☐ 0-5 K ☐ 5-10 K ☐ 10-15 K ☐ 15-20 K ☐ 20 K+
3. Setting or location of the institution (check one):
☐ Urban (within the city limits of a major metropolitan center, 50,000 people)
☐ Suburban (within one hour of a major metropolitan center)
☐ Rural (having no major metropolitan centers within a one hour driving distance)
4. **Yes** **No** Is webinar currently being used to teach online?
5. If so, for how long? ☐ <2 yrs ☐ 2-4 yrs ☐ 5+yrs ☐ NA

Faculty Characteristics

The following questions have been designed to characterize the faculty at your institution, and their readiness to adopt web conferencing in their pedagogy. Please refer to the Likert scale in making your responses.

Strongly				Strongly
Disagree		Disagree		Agree
1		2	3	4
			Neither Agree nor Disagree	
				5
			Agree	

6. **1 2 3 4 5** There is a high degree of faculty interest in adopting online learning.
7. **1 2 3 4 5** The faculty are confident in their ability to effectively use instructional technology.
8. **1 2 3 4 5** The faculty has a positive opinion about the effects of instructional technology on learning.
9. **1 2 3 4 5** The faculty has confidence in the instructional technology available to them.
10. **1 2 3 4 5** Faculty are concerned about their intellectual property rights with online content.
11. **1 2 3 4 5** Faculty members are aware of web conferencing technology.
12. **1 2 3 4 5** Faculty members have adopted web conferencing technology in one or more of their courses.
13. **1 2 3 4 5** Faculty members encourage their peers to use web conferencing in their courses.
14. **1 2 3 4 5** Faculty members have adopted web conferencing technology in one or more of their courses but subsequently have chosen to discontinue its use.

Infrastructure

Key factors in the adoption of educational technology are the equipment and software available. The next group of questions deals with the hardware and software that make up your institution's online learning infrastructure.

15. **Yes No** Your institution uses an online course (learning) management system such as Blackboard, Moodle, Sakai, or WebCT.
16. **Yes No** Your institution has made web conferencing software (such as Citrix Online, Elluminate Live, or Wimba Classroom) readily available.
17. **Yes No** All instructor work stations are fully capable of supporting web conferencing software and the necessary hardware (eg: webcams, microphones, and headsets).
18. **Yes No** The institution supplies webcams, microphones, and headsets so that instructors may conduct web conferences from their office.

Internet Capability

Available bandwidth and Internet connectivity are keys to Webinar use. Refer to the Likert scale to respond to the following questions about internet access and equipment at your institution.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1	2	3	4	5

19. **1 2 3 4 5** All of the classrooms have high-speed internet access.
20. **1 2 3 4 5** The library offers enough high-speed internet access points to meet student demand.
21. **1 2 3 4 5** All dormitories offer students high-speed internet.
22. **1 2 3 4 5** All classrooms have internet-capable, multi-media instructor work stations.
23. **1 2 3 4 5** All classrooms support wireless internet for student laptop access.
24. **1 2 3 4 5** The institution provides sufficient internet access points to meet student demand.
25. **1 2 3 4 5** The institution's network has sufficient bandwidth to support high volume use.
26. **1 2 3 4 5** A broadband connection sufficient to support web conferencing technology is available within a 10-mile radius of your campus.
27. **1 2 3 4 5** A broadband connection sufficient to support web conferencing technology is available in the school's recruitment region.

Hardware Status

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1	2	3	4	5

28. 1 2 3 4 5 No equipment components required for web conferencing are missing.
29. 1 2 3 4 5 Quality of equipment is at desirable level to support web conferencing.
30. 1 2 3 4 5 Quantity of existing equipment is sufficient to support web conferencing.
31. 1 2 3 4 5 Existing equipment meets or exceeds current standards for web conferencing.
32. 1 2 3 4 5 The network and servers are sufficiently maintained.
33. 1 2 3 4 5 Computer work stations, access points, and wireless hubs are sufficiently maintained

Organizational Factors

*Institutional culture has been shown to have significant impact on organizational innovativeness.
Please refer to the Likert scale to respond to the following statements about your school.*

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1	2	3	4	5

Organizational Climate

34. 1 2 3 4 5 The institution puts a high priority on providing fully online courses.
35. 1 2 3 4 5 The administration has a strong commitment instructional technology.
36. 1 2 3 4 5 The institution has insufficient funds to support online learning.
37. 1 2 3 4 5 The students show little interest in online courses.
38. 1 2 3 4 5 The institution gives a high priority to upgrading equipment, software & infrastructure.
39. 1 2 3 4 5 The administration has unrealistic goals about adapting traditional courses to online delivery.

Organizational Planning

Please continue to use the Likert scale. Which members of the following list have significant input into long-range Instructional Technology planning at your institution?

- 40. 1 2 3 4 5 Department chairs and college deans
- 41. 1 2 3 4 5 The Student Advisory Board
- 42. 1 2 3 4 5 The President, VP, and Provost
- 43. 1 2 3 4 5 The State Department of Higher Education or State University System
- 44. 1 2 3 4 5 **You** (Instructional Technology Director/Dean)
- 45. 1 2 3 4 5 The Information Technology Department Managers
- 46. 1 2 3 4 5 Instructional design staff (those who work to adopt and develop online courses)
- 47. 1 2 3 4 5 Faculty
- 48. 1 2 3 4 5 Committees (online learning, curriculum, etc.)

Course Delivery

Please refer to the following learning classification descriptions to answer the next few questions. These will help the researchers categorize your institution's online learning presence.

Online courses have been defined as those classes in which 80% or more of coursework delivered online, with little or no face-to-face meetings.

49. **Yes No** Does your institution offer *Online* courses?

Blended/Hybrid courses are where 30 to 79% of coursework is delivered online; this format blends face-to-face meetings & online content delivery to reduce the number of in-person class meetings.

50. **Yes No** Does your institution offer *Blended* or *Hybrid* courses?

Web Facilitated courses include between 1 and 29% use of web-based technology, such as course management systems, or web pages to post assignments, documents & syllabus.

51. **Yes No** Does your institution offer *Web facilitated* courses?

Traditional courses are where no online technology is used.

52. **Yes No** Does your institution offer *Traditional* courses?

Technical Support Factors

User support has also been shown to play a key role in the implementation and continued use of a technology. Using the Likert scale, please respond to the following statements about technology support at your institution.

Strongly Disagree		Disagree		Neither Agree nor Disagree		Agree		Strongly Agree
1		2		3		4		5

53. **1 2 3 4 5** **Your** (Dean/Director) time is not totally devoted to Instructional Technology support.
54. **1 2 3 4 5** Instructional Technology lacks a fair share of existing funds due to budgetary policies.
55. **1 2 3 4 5** There is a high reliance on student workers for daily Instructional Technology support operations, such as help desk and troubleshooting.
56. **1 2 3 4 5** Your department includes enough professional staff to train faculty to use instructional technology.
57. **1 2 3 4 5** The number of professional staff available to assist faculty with course content adaptation meets present and projected demands.
58. **1 2 3 4 5** Help desk hours of operation meets institutional demands.
59. **1 2 3 4 5** Students are satisfied with your ability to rectify technical problems and help them with troubleshooting.
60. **1 2 3 4 5** Faculty and staff are satisfied with your ability to rectify technical problems and help them with troubleshooting.
61. **1 2 3 4 5** Faculty members are satisfied with your professional development programs for using Instructional Technology.
62. **1 2 3 4 5** Faculty members are satisfied with your ability to meet their needs with online course development/adaptation.

Survey participation and sharing of results

As part of the study, principal investigator is willing to provide you a summary copy of the results should you desire to receive a copy.

Do you wish to receive a copy of the results (check) _____ Yes _____ No

I would just like to confirm your contact information and mailing address.

Name: _____
(First) (MI) (Last)

Title: _____

Address: _____

Phone: _____

E-mail: _____