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Student Perceptions of an Effective Learning Environment Across the Dimensions of Synchronous, Asynchronous, and Face-to-Face Instruction

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A Dissertation
Submitted to the Graduate Studies Office
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
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ABSTRACT

STUDENT PERCEPTIONS OF AN EFFECTIVE LEARNING ENVIRONMENT ACROSS THE DIMENSIONS OF SYNCHRONOUS, ASYNCHRONOUS, AND FACE-TO-FACE INSTRUCTION

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Prior to the implementation of computer technology in the classroom, the traditional classroom dynamic consisted of a chalkboard, a lectern, a teacher handout, and the occasional group assignments. However, as technology continues to evolve, so has the restructuring of the educational system (Woods & Baker, 2004). This evolution, which began as correspondence courses by mail, has resulted in a Web-based learning community characterized by its rich learner-centered environment where both student and instructor collaborate and engage in constructivist practices (Conrad & Donaldson, 2004).

This study sought to expand the existing body of knowledge on distance learning and employed quantitative techniques (multiple linear regression, One-Way Manova, and Repeated-measures design) to investigate students' perceptions of the quality of courses delivered through synchronous and asynchronous instruction and compared their perceptions to face-to-face instruction. A sample comprised of undergraduate and graduate students from five regional universities was used to complete the study.

Results from the study showed no statistically significant relationship among student demographics and technological skills. The researcher did find a statistically significant difference between students' rating of quality instruction when given a preference between synchronous online instruction with voice and asynchronous online

instruction. Such findings reveal that when students are given a choice between synchronous online instruction with voice and asynchronous online instruction they tend to prefer an asynchronous online environment. Last, there were no statistically significant differences regarding students' perceptions of quality instruction based on gender.

These results suggest that university administrators should consider investing in computer instructional technologies regardless of student demographics. Other results from the study show that despite the many features of SOIV, seem to prefer an asynchronous online learning as compared to synchronous online learning regardless of gender.

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CHAPTER I

INTRODUCTION

Prior to the implementation of computer technology in the classroom, the traditional classroom dynamic consisted of a chalkboard, a lectern, a teacher handout, and the occasional group assignments. However, as technology continues to evolve, so has the restructuring of the educational system (Woods & Baker, 2004). The most dramatic changes have occurred over the past decade as learning shifted to an environment of meaning making, social negotiation, and communities of learning (Jonassen & Land, 2000). The learning shift is the underlying reason why instruction is no longer a transmission of knowledge but has evolved into a student-centered approach (Reigeluth, 1999). Students are no longer passive recipients of knowledge; they play more of an active role in constructing new knowledge (Reigeluth) with the assistance of faculty.

In addition to the restructuring of the traditional education model, distance learning has also evolved. This evolution, which began as correspondence courses by mail, has resulted in a Web-based learning community characterized by its rich learner-centered environment where both student and instructor collaborate and engage in constructivist practices (Conrad & Donaldson, 2004).

Presently, Web-based or online instruction is the fastest growing sector of distance learning (Benke, Bishop, Thompson, Scarafiotti, & SchWeber, 2004; U.S. Congressional Web-based Education Commission, 2000). Waits and Lewis (2003) reported that in 2000-2001, there were an estimated 3, 077,000 students enrolled in distance learning courses offered by two and four-year institutions of higher learning.

Additionally, in 2002, over 1,680 university institutions offered over 54,000 online courses. Another study by the College Technology Review reported that in the 2004-2005 academic year, two out of three institutions offered Web-based/online programs. C.J. Bonk (2001) projected that by the year 2011, Web-based instruction will account for 73% of university teaching loads. According to Saba (2005), web-based education will change the face of education in the future by becoming the dominant tool for teaching and learning.

Background of the Study

Web-based/online education, similar to face-to-face instruction, is slow to adapt to any type of change. Web-based and computer-mediated learning has been and continues to be scrutinized because of the long-believed perception that it is inferior to face-to-face instruction (Sener, 2004). Web-based/online courses undergo more extensive reviews than face-to-face courses do.

Harvard University professor of Learning Technologies Chris Dede produced research which refuted the assumption that face-to-face instruction is the standard to which all instructional environments and strategies must be compared (Young, 2002).

> Many people find their voice in distance media in a way that they do not find in face-to-face sessions. A shy student, for instance, might never participate in a classroom environment, but the student might frequently speak up in online forums where students have more time to think before they comment. And not all students learn the same way, Mr. Dede argues, so presenting materials in a range of formats can help make sure student is fully engaged in at least some class activities. (¶ 4-6)

Statement of the Problem

A recent study published in the Review of Educational Research (Bernard, Abrami, Wade, Brookhovski, Lou, & Wozney, 2004) concluded that, despite the fact that there is a large amount of research available on Web-based/online instruction, it is difficult to draw firm conclusions as to what works and does not work. The study suggests that there are various applications of Web-based instructional formats that outperform their face-to-face classroom counterparts and some that do not. Current course management systems such as Blackboard or WebCT do not accommodate for inherent learner differences. Even though these learning environments provide students with needed collaboration, flexibility, and convenience, students demand more interaction (Simonson, Smaldino, Albright, Zvacek, 2003).

Despite the fact that Web-based instruction is still in its infancy and is a new way to instruct and learn, research practitioners have had substantial time to start assessing what works and what does not in Web-based learning environments. There is limited research to address the benefits of synchronous learning formats (combining voice with threaded discussion in real-time) over asynchronous learning (threaded discussion without voice where students participate at different times).

Many believe that faculty should redesign course content to take advantage of the unique characteristics of the Web-based learning environment, which include the ability of students to participate in a learning environment that is learner-centered, flexible, and can accommodate for learner differences. It is imperative that researchers address the critical issue: how do the elements of an online learning environment compare to those in a face-to-face environment in fostering learning? Failure to conduct research to assess the

nature of Web-based instruction will only perpetuate the problem of faculty who refuse to embrace Web-based learning.

Justification

Despite the rapid growth of Web-based/online instruction in higher education, many faculties do not see the potential of Web-based instruction in improving student learning and achievement. This could easily be attributed to all of the media comparison studies that label Web-based instruction or any kind of instruction other than traditional face-to-face instruction as inferior (Conger, 2005). For the most part, instead of the Web-based courses using a student-centered model of instruction, many of these courses simply use the same teacher-centered delivery model that can already be found in traditional face-to-face classrooms (Twigg, 2001).

Purpose of the Study

The primary objective of this research was to assess student perceptions of Web-based instruction. The researcher investigated different elements of effective learning environments and will use quantitative measures to compare the effectiveness of these elements when face-to-face, synchronous online, and asynchronous online instruction is used.

Research Questions

The following questions involving students' perceptions of the quality of courses delivered through Web-based instruction were addressed in the study:

1. Is there a statistically significant relationship between student demographics and students' self-perceived proficiency with computer technology?

2. Is there a statistically significant difference among student perceptions regarding the degree to which they perceive course quality is achieved through synchronous online instruction with voice (SOIV), asynchronous online instruction, and face-to-face instruction?
3. Is there a statistically significant difference between genders regarding the degree to which each perceives that course quality criteria are met through synchronous online instruction w/voice (SOIV), asynchronous online instruction, and face-to-face instruction?
4. Is there a statistically significant difference between graduate and undergraduate students regarding the degree to which each perceive that course quality criteria are met through synchronous online instruction w/voice (SOIV), asynchronous online instruction, and face-to-face instruction?

Hypotheses

H1: There is a statistically significant relationship between student demographics and students' self-perceived proficiency in the use of computer technology such as word processing, spreadsheets, slideshow, online research, chat/threaded discussion, statistics programs, programming, and online programming.

H2: There is a statistically significant difference among student perceptions regarding the degree to which they perceive that course quality is achieved through synchronous online instruction with voice (SOIV), asynchronous online instruction, and face-to-face instruction.

H3: There is a statistically significant difference between males and females involving the degree to which they perceive that course quality is achieved through

synchronous online instruction with voice (SOIV), asynchronous online instruction, face-to-face instruction, and other media delivery.

H_4: There is a statistically significant difference between graduate and undergraduate students regarding the degree to which each perceives that course quality criteria are met through synchronous online instruction w/voice (SOIV), asynchronous online instruction, and face-to-face instruction.

Delimitations

The study was limited by the following: The participants were drawn from voluntary undergraduate and graduate student volunteers. Only public institutions of higher education participated in this study. Participants for the study were drawn from the ranks of undergraduate and graduate students who either have previously enrolled or are presently enrolled in online courses. Participants' responses to the study may have been biased as compared to students who have never been enrolled in an online course.

Definition of Terms

The following definitions are used in the study:

Asynchronous online instruction/learning - A collaborative, instructional format where students and faculty interact at different times. This delayed interaction provides the student with flexibility, independence, and control over his or her learning environment (Driscoll, 2001).

Distance learning - Distance education or distance learning has come to mean more than a transmission mode of education. Distance education today refers to the use of network-based technologies, as well as Internet based delivery (Howell et al., 2003).

Face-to-face instruction/learning - Instruction that occurs with students and instructor in same physical-space and in real-time. Instruction can be in the form of a lecture format or project based.

Synchronous Online Instruction/Learning with Voice (SOIV) - Instructional learning or communication where both faculty and student can interact with each other in real-time via computer mediated instruction with voice capabilities (Clark & Mayer, 2003).

Web-based instruction/learning - Refers to the use of various communication technologies, such as e-mails, web sites, and list serves, to deliver and receive course communications and materials such that at least 80% of the course content is delivered online (Allen & Seaman, 2005). Online learning, E-learning, Internet learning, distributed learning, virtual learning, and distance learning represent different terminologies used to describe Web-based instruction (Anderson & Elloumi, 2004). Thus, the terms distance learning, online learning/instruction and Web-based learning will be used interchangeably.

Summary

The introduction of the study provided a short background on the World Wide Web and the theoretical framework of the study. Next, a discussion on how Web-based instruction has significantly influenced instruction in higher education is given. This discussion provides the framework for the study's problem, justification, and research questions. Operational definitions are included to assist the reader with terms used in the study. The next chapter will review relevant literature in the study.

CHAPTER II

REVIEW OF RELATED LITERATURE

The researcher investigated different dimensions of effective learning environments across the delivery formats of synchronous, asynchronous, and face-to-face learning to compare student perceptions of these formats. The literature review focuses on: (a) history of Web-based instruction, (b) theoretical framework, (c) distance learning theory, (d) contemporary instructional technology, (e) assessment of web-based courses, (f) rubrics for evaluation of quality in Web-based instruction, and (g) students' perception.

History of Web-Based Instruction

Stages of Development

The evolution of distance learning could be traced back from correspondence study based on printed material to radio and television and the use of computer technology today. Moore and Kearsley (2005) outlined the four major stages of the development of distance education: (a) correspondence study by mail between 1870 to 1890; (b) the opening of universities involved in the total systems approach based on correspondence, radio, and television and recorded media during the 1920's; (c) course delivery by broadcast television, telephone interaction, satellite, cable and Integrated Service Digital Network lines in 1970; and (d) computer mediated instruction through use of the World Wide Web during the 1990's.

Distance education's history, philosophy, and methodology are strongly rooted in correspondence education. Correspondence education began in the 1800's when small private institutions delivered course material by mail. Years later, universities gave it the

name independent study (Moore & Kearsley, 1996). In Europe, Issac Pittman started his correspondence courses in stenography in 1840 (CDLP, 2004). This type of distance education was described as one of the most interesting developments in recent years in the educational world (Bastiaens & Martens, 2000). Years later, Anna Tickor, from her home in Boston, Massachusetts, began the first home study program in 1879 with the purpose of providing opportunities for women across all social classes to obtain an education (Watkins, 1991). The early 1900's welcomed broadcast media to higher education. Between 1911 and 1922, state universities in Iowa, Ohio, and Wisconsin began using radio in instruction. Radio was replaced by television in 1934 as the University of Iowa began using television broadcasts for course delivery (Moore & Kearsley, 1996).

Educational television owes its success to a special grant awarded by the Ford Foundation to construct satellites to broadcast the first educational programs in 1950. The grant allowed for the Midwest Program of Airborne Television Instruction in1961. Airplanes carried transmitters which broadcasted educational programs throughout the Midwestern states (King, 1997). These programs paved the way for passage of the Federal Educational Television Facilities Act and the Public Broadcasting Act of 1977. These acts required cable companies to provide educational channels as a part of their systems (Moore & Kearsley, 2005). In 1967, the British Open University was open to anyone regardless of previous educational background and was the first institution of its kind in Great Britain to employ the use of audiovisual and computer media to supplement print material, as well as audio and videotape (Moore & Kearsley, 2005). Last, in 1980 to

1990, the development of computers along with the World Wide Web allowed computer–mediated instruction to play a significant role in distance leaning (2005).

Web-based/online instruction is the fastest growing category of distance education (Benke et al., 2004). The National Center for Educational Statistics (NCES) report that in the years 2000-2001:

1. An estimated 3,077,000 students were registered for distance educations courses.
2. An estimated 2,876,000 students were enrolled in university-level, credit granting distance learning courses .
3. Eighty-two percent were offered on the undergraduate level (Waits & Lewis, 2003).

In a later study, Simonson et al., (2003) reported 1,680 institutions were offering over 54,000 online courses in the 2002 academic year. During the 2004-2005 academic years, The College Technology Review reported that two out of three institutions offered distance-learning programs with 63% of these institutions offering accredited degrees in at least one discipline (MDR, 2006). Most institutions of higher learning offer some form of distance learning (Saba, 2005). The College Technology Review reported that two out of three universities offered distance-learning curriculums. According to Saba (2005), by the year 2011, distance learning will soon be the dominant form of teaching if this trend continues.

The Web has made it possible to connect diverse populations all over the world and sparked higher education to seek ways to better prepare professors to use this new technology (Dexter, Doering, & Riedel, 2006) because universities already utilize the

Web in almost all of their operations (Howe, 2004). Although the Web is often used as the defining technology in the distance learning field, it only represents one area in technology that has helped to shape distance learning.

Definition of Distance Learning

Distance learning's unusual origin and unprecedented rapid growth during the last two decades has produced a number of definitions and theoretical explanations (Anderson & Garrison, 1997; Garrison, 1989; Holmberg, 1977, 1989; Keegan, 1988; 1990; Keegan & Rumble, 1979; McKenzie, Postgate, & Scupham, 1975; Moore, 1973; 1977, 1993; Peters, 1994a, 2000; Saba, 1988; Sewart, 1978; Shale, 1988; Wedemeyer, 1971). However, many of these researchers agree that the term "distance learning" covers various forms of study at all divisions in which students are not under the immediate supervision of an instructor in a classroom or on the same premises (Holmberg, 1993). For this aforementioned definition, distance learning is distinguished from face-to-face instruction.

In the hopes of developing a definition of distance learning, Keegan (1996) analyzed all of the definitions from the authors cited above to develop five characteristics of distance education:

1. The quasi-permanent separation of teacher and learner through the length of the learning process; this distinguishes it from conventional face-to-face education.
2. The influence of an educational organization both in the planning and preparation of learning materials and in the provision of student support services; this distinguishes it from private study and teach-yourself programs.

3. The use of technical media—print, audio, video, or computer—to unite teacher and learner and carry the content of the course.
4. The provision of two-way communication so that the student may benefit from or even initiate dialogue; this distinguishes it from other uses of technology in education.
5. The quasi-permanent absence of the learning group throughout the length of the learning process so that people are usually taught as individuals rather than in groups, with the possibility of occasional meetings, either face-to-face or by electronic means, for both didactic and socialization purposes (Keegan, 1996, p. 50).

In 2002, Keegan developed five criteria that define distance learning as a learning format:

1. Distance learning is a quasi-permanent separation between teacher and learner which distinguishes it from face-to-face instruction.
2. Distance learning has an influence on educational organization through the planning and preparation of the materials and provision of student services.
3. Distance learning should utilize print, audio, video, computer, and internet to convey course content and communication between teacher and student.
4. Distance learning is a provision for two-way communication for student benefit in which a student can initiate dialogue.
5. Distance learning is a quasi-permanent absence of the learning group in which learning is conducted independently with some face-to-face instruction.

Moore and Kearsley (2005) viewed the basic of concept of distance education to exist only when both teacher and student were separated by distance and time. They defined distance education as, "Planned learning that normally occurs in a different place from teaching, requiring special course design and instruction techniques, communication through various technologies, and special organizational and administrative arrangements (p.2).

After careful review of all of the definitions above, one would conclude that the study of the impact of distance learning cannot just focus on technology or the distance between student and professor. Learning environments should be examined for their flexibility to balance the structure and independence between the learning institution and the student. This concept of distance learning that Moore defined as being a transactional distance (2005) in the future must account for learner differences and not necessarily be based on pre-determined programs (Saba, 2005).

Theoretical Framework

Moore and Kearsley's Distance Learning and Interaction theory (2005), and Kearsley's Engagement theory (1997) will be used as a basis for understanding the unique role and nature of Web-based learning environments and will form the theoretical framework of the study. Moore and Kearsley's theories put the learner and his or her interaction and engagement with their instructors and other students in a Web-based environment at the center of the learning process. The two researchers' theories support the notion that students' perceptions of quality instruction in Web-based learning formats can be affected by the level of interactivity and how engaged they are in a Web-based/online learning environment.

Distance Learning Theory

Distance learning theory explains why education conducted at a distance is different from other forms of education. Some researchers in the past focused their distance learning theories on the organizational or structural issues of distance education (Garrison & Anderson, 2003; Keegan, 1993). However, Moore and Kearsley (1996; 2005) defined the relationship between student and teacher as educational and psychological distance—the interaction between the student's autonomy and control and the instructor's ability to exert structure and control on the learning environment (Saba, 2003).

Moore and Kearsley's study (2005) carefully defined the three important interactions: (a) between learner and instructor, (b) among and between learners, and (c) between learner and web format. These levels of interaction are very significant in that they will form the barometer to gauge student satisfaction and ultimately offer implications for student motivation in using Web-based/online instruction.

Interaction

Moore and Kearsley (1996) identified three types of interaction: learner to instructor, learner to content, and learner-to-learner. According to Moore, interaction is an important key to success in the traditional classroom as well as in online classrooms (1996). Learning experiences should support interaction as well as communities of interest (American Distance Education Consortium Guiding Principle, 2003). Chickering and Gamson's (1987) study reflects the importance of interaction between learner and instructor, learner-to-learner, and synchronous conversations. Interaction plays a critical role in designing learning environments that foster participation, communication and

meaningful learning (Anderson, 2003). In the face-to-face learning environment, most interaction between student-to-student and student-to-faculty is based on voice communication (Garrison, Anderson, & Archer, 2000) whereas in the online learning environment interaction between faculty and students occurs through web-based tools such as computer-mediated communication (Lapadat, 2002).

Engagement Theory

Although not directly derived from other theoretical frameworks for learning, engagement theory shares many commonalities and is consistent with other constructivist approaches to learning (Kearsley, 1997). "The fundamental premise underlying engagement theory is that students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks" (Kearsley & Schneiderman, 1998, p. 20). Collaborative skills are created and utilized as students interact student-to-student, student-to-teacher, and student-to-content. Engagement in online learning is different from simple interaction with technology because of the change in focus from computers in education as a form of a media delivery tool to that of a communication tool in a special setting for learning (Steinbronn & Meredith, 2007). However, as previously stated, the levels of degree of student engagement and interaction in an online environment can be strong determiners of how students may rate their perceptions of quality instruction in a Web-based learning environment.

Contemporary Instructional Technology

The educational shift to more student-centered approaches to learning has caused teachers to modify their instructional strategies and integrate instructional technologies across the curriculum. The growth of the Web as well as other interactive and

collaborative instructional technology has made computer online technology increasingly powerful and flexible (Wozney, Venkatesh, & Abrami, 2006). Some of the surface features of contemporary instructional technology, such as computer-mediated instruction, interactive video technologies, and online learning (synchronous and asynchronous instruction) have been driving forces behind effective learning and instruction (McDonald, Yanchar, & Osguthorpe, 2005). A contemporary author made the assertion, "The Web is the future... Students learn to ask better questions, to make better arguments, and to present themselves more positively over the Web" (Ellsworth, 1994, p. p. 5). Benke, Bishop, Thompson, Scarafiotti, and SchWeber (2004) reported that 86% of college students, compared to 59% of the general population, use the internet, and 49% of the these students begin using the internet before they arrive at college (2004). The Web is seen by many as a productive and functional tool that has altered the way society interacts with itself and with information in its daily life.

According to Kearsley (2000), web-based/online education is more humane and personal than most forms of classroom instruction. Web-based educational programs can range from independent study to more formal course delivery (synchronous and asynchronous technologies). These programs may also include blended learning approaches that combine Web-based learning and face-to-face instruction.

Other distance delivery media such as video conferencing was found by students to be very interactive and engaging. Students enjoy the two-way audio/video features of video conferencing. Despite the benefits of video conferencing, there were several grey areas noted by students believed to be problem areas experienced by students:

1. Lack of hands-on experiences.

2. Scheduling problems related to time zone differences.

3. Technical problems: bad connections, low bandwidth, internet traffic (Locatis, 2006).

Despite the fact that technology is becoming an everyday part of life, there is still a resistance to embracing it within the realm of higher education. Implementation of technology can range from one that is successful to one that is a failure (Lofstrom & Nevgi, 2007). The selection and integration of technology in higher education should be accomplished in a way that learning is enhanced but organizational priorities remain intact (Gilbert, 2000).

Assessment of Web-based Courses

Researchers have employed methods for comparing of the effectiveness of Web-based/online learning with that of face-to-face learning. Web-based courses should be assessed for quality and effectiveness. The next section of the study describes past studies that purported to compare Web-based instruction to face-to-face instruction and explores how both could yield similar student outcomes. Last, the researcher presents different rubrics to assess quality and effectiveness in Web-based courses of instruction.

No Significant Difference

Since the advent of correspondence courses in the early 1900's, many researchers and educators questioned whether students would be able to learn at a distance as well as they could face-to-face. Such questioning sparked much controversy and debate that led to the movement in media comparison studies (MCS's) in education. In these studies, researchers compared student outcomes for two different courses that were delivered

through two different methods in which one medium was labeled "superior" for teacher effectiveness (Conger, 2005).

Today, almost 108 years since the inception of MCS's in education, society has seen all types of innovations in technology. From radio to television and two-way video to the internet, the debate continues. Researchers ask, "Is face-to-face instruction better?" "Is one medium delivery superior to another?" As long as traditionalists view face-to-face instruction as the standard and innovators believe that computer-mediated instruction can improve student learning, the debate will continue to persist (Conger, 2005).

Despite the fact that Web-based instruction is a relatively new field, recent studies have been conducted in order to draw conclusions as to what works and does not work (Bernard et al., 2004; Joy & Garcia, 2001). These researchers have not adequately compared the extent to which online and face-to-face classroom formats address the characteristics of an effective learning environment. These researchers suggest that there are various applications of web-based instruction that are more effective than face-to-face classroom learning, and there are also many applications that perform poorly. Bernard et al., (2004) suggested that one should examine aspects of the design of the course in respect to either media or methods that are more effective.

Face-to-Face Instruction

As stated earlier, face-to-face instruction is teaching that occurs with students and instructor in the same physical-space and at the same time. Face-to-face instruction in higher education often utilizes a lecture/discussion format in a classroom setting with a professor lecturing and students patiently listening and writing notes. The professor and

students agree to meet at a given place and time where interaction between professor and student tends to be a teacher-learner centered environment (Moore & Kearsley, 1996).

Face-to-face and Web-based Learning: A Comparison

According to Chris Dede (as cited in Young, 2002), a professor of educational technology at Harvard University, students can successfully find a voice in distance learning in a way that they are not able to in face-to-face instruction. Many shy students rarely participate during a regular classroom-learning environment but feel more comfortable participating in online forums. Last, Dede argues that not all students comprehend material the same way—therefore, presenting materials in a variety of formats will ensure that every student is fully engaged in at least some class activities. Woo and Reeves (2007) describe interaction as an essential ingredient in any learning process. Moore and Kearsley (1996, 2005) produced a series of studies to assert that university administrators must recognize that distance learning environments can be created that are as interactive as the classroom learning environment. However, according to Wanstreet (as cited in Ward, Peters & Schelley, 2007), educators are unsure what types of interaction students need, want, or expect to foster learning in an online learning environment (2006). A recent study published in the *Review of Educational Research* (Bernard et al., 2004) stated, "Even though the literature is large, it is difficult to draw firm conclusions as to what works and does not work in regard to distance education" (p. 404). The study suggested, "There are various applications of distance education that outperform their classroom counterparts and some that perform more poorly" (p. 3).

Literature Asserting the Superiority of Web-based Instruction

In 2001, Hiltz and a cadre of researchers compared 19 media comparison studies and concluded that asynchronous learning networks are as good or more effective for learning outcomes and student satisfaction than face-to-face learning when examining course mode of delivery, student outcomes, and quality of instruction (Hiltz et al., 2001).

Dzuiban and Moskal (2001) discovered the uniqueness of Internet technologies' ability to transform teaching and learning in higher education. They cited previous educational technology's tendency to replicate the classroom environment and its traditional teaching methods as the reason for why this technology failed to foster an effective learning environment (2001). White, Roberts, and Brannan (2003) asserted that until a course is reconceptualized using an interactive learning pedagogy, the results are nothing more than a correspondence course via e-mail. Therefore, simply transferring a face-to-face traditional classroom-based course to an online format is a method doomed for failure (2001).

During the Fourth Annual Pew Symposia in Learning and Technology in 2000, Twigg (2001) addressed the major challenges of higher education: improving quality, increasing access, and reducing costs. The participants came from institutions of higher learning that were already moving beyond the No Significance Phenomenon and using innovative approaches to online education (2001). Twigg came to the realization that only technological innovation that maximizes the unique potential of the Internet—rather than bolting technology onto existing traditional, face-to-face course designs—will guarantee success in web-based/online education. Such an innovation calls for learner-centered design and instruction that treats students as separate individuals. Learner

environments should be learner-centered, flexible, and accommodate for different learning strategies (2001).

Assessment of Course Instruction and Design

It is important for researchers to carefully and individually examine course instruction and design to determine which aspects of Web-based learning are more effective than face-to-face learning. Course design can be assessed for quality and effectiveness before the course is taught (Quality Matters, 2005). There are specific areas of course design that are extremely important in an online course.

1. The design plan, which must be developed before a course is actually designed.
2. The design realized, which entails developing the course following the design plan.
3. The design in practice, which is the point where the course is actually taught (Rhodes, 2003).

Formative and summative evaluations are a useful method for evaluating the instructional design of a course and are a necessary part of a well-designed online course (Dick & Carey, 1990; Gagne, Briggs & Wagner, 1992). Formative and summative evaluations allow both instructor and student to stay connected and serve as a method for evaluating the effectiveness of course design and instruction and is an effective method for an instructor to receive feedback from students on the ease of use of the technology (Chico State University, 2005).

In order to assess whether elements of Web-based instruction fare better than face-to-face instruction, one must consider design and instruction separately and look for

aspects of quality and effectiveness. In order to assess quality, one would have to examine different properties, attributes, or traits of an online instructional format and how they meet measures of excellence or perhaps one of the identified best practices for an effective learning environment (Quality Matters, 2005). In order to establish which measurement to use in assessing quality in web-based/online courses, one must consult research from various peer-reviewed journals devoted to the study of higher education

The American Association of Higher Education (AAHE) published a seminal study, Seven Principles for Good Practice in Undergraduate Education in Effective Teaching Practices (Chickering & Gamson, 1987). With a mission to improve undergraduate education, the authors examined over fifty years of research and identified seven principles to guide students and faculty, administrators and student support personnel towards higher quality in post-secondary instruction. These principles have not only become a widely used framework for evaluating quality in face-to-face traditional courses, but are often used to evaluate and design online courses. Chickering and Gamson's principles are used in higher education institutions to improve teaching practices and educational experiences (Graham, Cagiltay, Lim, Craner & Duffy, 2001). The seven principles extol instruction that:

1. Encourages contacts between students and faculty.
2. Develops reciprocity and cooperation among students.
3. Uses active learning techniques.
4. Gives prompt feedback.
5. Emphasizes time on task.
6. Communicates high expectations.

7. Respects diverse talents and ways of learning (p. 4-6).

These seven principles set the standard for high quality work. These principles are simple to comprehend and can be used to cover any discipline. They can also be used as a framework for the assessment and evaluation of online classes. However, one must examine findings with cautious optimism as Chickering and Gamson's target population was undergraduate students. Findings from their study must not be generalized across higher levels such as graduate studies. This addresses the need for this study, where the researcher examined Web-based/online instruction from the lens of graduate students, which will enable us to see how these modern technologies apply at such levels. Graduate students, however, perform more independent work than undergraduate students and warrant an instructor to be as detailed as possible. This creates a platform whereby perceptions of graduate students may not necessarily hold with findings from the Chickering and Gamson's study.

Chickering and Erhmann (1996) reexamined these principles in relation to the emerging information and communication technologies. The authors studied the "most cost-effective and appropriate way to use these technologies to promote the seven principles" (p.3). The authors considered communication functions to be the most effective use of technology in encouraging contact between instructors and students. Under the first principal communication, technologies have increased opportunities for students to interact better with each other. Next, the second principle of reciprocity and cooperation among students is supported. An interesting phenomenon from the student use of computers is the extent to which computer–based tools help to foster a collaborative and spontaneous environment. Mediums such as e-mail and discussion

boards are effective tools to use for learning teams. Though distance learners are geographically dispersed, they can still come together to solve various issues. Distance learners are also able to work together in an online format to solve various problems, making cooperative and collaborative projects possible.

The third principle is active learning and Chickering and Ehrmann (1996) categorized the plethora of tools used in active learning under three labels: learning by doing, real-time conversation, and time-delayed interaction. Tools used for information gathering, simulation software, and creation software can foster "apprentice-like activities" (p.5) using computer technology. The fourth principle describes the advantages of prompt feedback. E-mail communication, interactive web activities, self-tests, online quizzes, and the ability to use media on web pages are just some of the ways that technology has increased the range and scope of feedback to enhance learning. The fifth principle deals with time on task. New technologies can increase efficient use of time using online access to libraries and communication with teachers and fellow students. They can work on assignments from home without having to spend time commuting to campus.

The sixth principle explains why instructors must maintain high expectations from their students. High expectations are implicit in web-based instruction for both students and instructor and do not have to be stated. If an instructor produces substandard work such as sloppy web pages and web logs for a class, the students will quickly assume that an instructor has low expectations for them because of what they see modeled for them. Therefore, course materials must be of superior quality so a high level of expectation can be promoted.

Finally, the last principle deals with respect for diverse talents and ways of learning. Technology has the ability to help diverse learners. It enables instructional activities to be conducted through various processing channels (Chickering & Ehrmann, 1996). Technology also provides opportunities for learning in a social and collaborative environment where learners with different personalities and socioeconomic statuses can engage in learning in different ways.

Chickering and Gamson's (1987) principles have become a widely used framework for evaluating quality in traditional classrooms. In addition, these principles have been used to evaluate online courses and have been incorporated into the design and development process of creating online courses. These seven principles are also widely cited in the literature of higher education and technology. These principles lay a solid foundation of what to look for in quality courses and can be used as a framework for the assessment and evaluation of quality in online courses (Achtemeier, Morris, & Finnegan, 2003).

Rubrics for Evaluation of Quality in Web-based Instruction

Although some universities still use checklists to evaluate quality, rubrics offer a more concise measure of quality for a broader range of components of Web-based courses of instruction. These rubrics use the following categories: course design/organization, course development, interaction/collaboration, assessment, technology, learner support, and evaluation and maintenance. Before a course is taught, quality and effectiveness in a course's design must be assessed. All of the evaluation instruments mentioned above investigate the various aspects of course design before course instruction begins (Chico, 2005, ¶ 3; Quality Matters, 2005; WebCT, 2005).

A committee comprised of faculty, staff, administrators, and a student from Chico State University came together in 2002 to review the best practices in Web-based courses. The committee reviewed existing best practices, learning styles, and standards; among these resources were Chickering & Gamson's, "Good Teaching Practices in Undergraduate Education", Bloom's Taxonomy, and Graf and Caines' WebCT Exemplary Course Rubric. After careful review, the committee developed guidelines for developers of Web-based instructional formats to help them better develop and evaluate web-based courses (Chico State University, 2005, Background of Rubric for Online Instruction, para.1). The criteria are:

1. Learner support and resources.
2. Online organization and design.
3. Instructional design and delivery.
4. Assessment and evaluation of student learning.
5. Innovative teaching with technology.
6. Faculty use of student feedback.

Quality Matters Rubric. The Quality Matters Project was designed to develop a pathway for inter-institutional quality assurance and course improvement in online learning (About QM, ¶ 1; Quality Matters, 2005). It also proposed the creation of a process to certify the quality of online courses. The rubric uses seven broad categories and forty criteria that assess quality for online courses based on research literature and national standards including Chickering and Gamson's (1987) Seven Principles and Chickering and Ehrmann's (1996) article. The categories used are:

1. Course overview and introduction.

2. Learning objectives.

3. Assessment and measurement.

4. Resources and materials.

5. Learner interaction.

6. Course technology.

7. Learner support.

WebCT's Exemplary Course Project Rubric. This rubric was used as an evaluation and assessment tool for Debt's Exemplary Course Project Award. Since 2002, WebCT has been selecting courses for this award. Despite the fact that this rubric includes only criteria and not levels of quality, it is very thorough and complete and could be used as a model for assessing quality in online courses (WebCT, 2005). This rubric uses six categories for assessing quality in online courses:

1. Course design.

2. Interaction.

3. Collaboration.

4. Technology.

5. Assessment.

6. Learner support.

Moore's Five Pillars of Quality. Moore's Five Pillars of Quality were created to lead an institution's improvement process. These pillars identify goals and benchmarks that help measure progress towards achieving the goal of providing quality in a Web-based learning environment (Moore, 2002). The five pillars are:

1. Learning effectiveness.

2. Cost effectiveness.

3. Access.

4. Faculty satisfaction.

5. Student satisfaction.

The pillars are interrelated such that an aspect of an online learning environment may not fit neatly or completely under one pillar; a given aspect could lie across all or some of the other pillars. With the exception of the cost effectiveness pillar, all of the other four pillars will be defined. The "cost effectiveness" will be mentioned in connection to the other pillars.

Learning Effectiveness

The learning effectiveness pillar uses practices as summarized by Chickering and Gamson's Seven Principles for Good Practice in Undergraduate Education (Chickering & Gamson, 1987). Under the learner effectiveness pillar, there are more opportunities for interaction between students and professors in an online learning environment. There is also a potential for creating better learning experiences and creating learning networks (Moore, 2002).

The goals of the learning effectiveness pillar are:

1. Interaction is key: with instructors, classmates, the interface, and via vicarious interaction.
2. Metrics are used for comparing online and traditional courses.
3. Online course design takes advantage of capabilities of the medium to improve learning via testing, discussion, and materials.
4. Courses are instructor-led.

5. Communications and community building are emphasized so that swift trust characterizes the online learning community.
6. Distinctive characteristics of the program are highlighted to demonstrate improved learning.
7. On-campus and online instruction achieve comparable learning outcomes, and the institution ensures the quality of learning in both modes by tracking instructional methods, student constituencies, and class size (Moore, 2002, p.2).

Access

Access means that "all qualified, motivated students can complete courses, degrees, or programs in the disciplines of their choices" (Moore, 2002, p. 26). Students at the institutional level should be provided the infrastructure and course management tools necessary to create stable access to learning environments and learner support services.

The goals for this pillar are:

1. Diverse learning abilities are accounted for, including at risk students, disabilities, and expert learners.
2. The delivery mechanism is continually evaluated for reliability and functionality.
3. Learner-centered courseware instruction is provided.
4. .Student feedback is used for continuous improvement.
5. Students are able to take the courses they want, when they want.
6. Connects students to multiple learning opportunities (Moore, 2002)

Faculty Satisfaction

Faculty satisfaction is very important in an online environment. According to Moore, the faculty experience of teaching online must be as effective and professionally beneficial as the face-to-face teaching experience. Moore believed that faculty receives the same satisfaction from teaching online as they would in a face-to-face learning environment (Moore, 2002). The goals for the Faculty Satisfaction pillar are:

1. Faculty are pleased with teaching online.
2. Faculty satisfaction metrics show improvement over time.
3. Faculty contribute to and benefit from online instruction.
4. Faculty are rewarded for teaching online and for conducting research about improving teaching online.
5. Sharing of faculty experiences, practices, and knowledge about online instruction is part of the instructional structure.
6. There is a parity in workload between classrooms and online teaching.
7. Significant technical support and training are provided by the institution (Moore, 2002, p. 4).

Student Satisfaction

"The student satisfaction pillar measures students' overall satisfaction with learning, teaching, affordability, and access" (Moore, 20002, p.42). Students demand convenience and flexibility as well as access to an education that is independent of time and distance in Web-based/online programs. Students desire to have the opportunity to

take advantage of multiple ways of learning, such as fully online and hybrid options or synchronous and asynchronous modes. Students also want highly interactive courses that use situated or problem-based learning to connect what they are learning to real life application. Last, they would like to have 24 hour technical support with frequent and prompt feedback from the instructor throughout the semester (Moore, 2002). The goals of the Student Satisfaction pillar are:

1. Students are pleased with their experiences in learning online.
2. Discussion and interaction with instructors and peers is satisfactory.
3. Actual learning experiences match expectations.
4. Satisfaction for services is at least as good as on the traditional campus.
5. Orientation for how to learn online is satisfactory.
6. Outcomes are useful for career, professional, and academic development (Moore, 2002, p. 6).

Students' Perceptions

A student's success and satisfaction are highly correlated with a teacher's perception of effectiveness (Bollinger & Martindale, 2004). Since university faculty are assessed and the quality of university programs is evaluated based on student satisfaction, it would seem logical to investigate the components of online instruction and delivery that will foster student satisfaction.

Student satisfaction has a strong correlation with the performance of the instructor (Bollinger & Martindale, 2004). An instructor should communicate with students on a daily basis. Swan (2003) discovered that students who rated their level of activity as high reported significantly higher levels of course satisfaction and higher

levels of perceived learning. According to Shea, Swan, Fredericksen & Pickett (2002), satisfaction and learning were significantly correlated with interaction, feedback, and clear expectations from a learning perspective. Collaboration and independence together represent the distinctive properties of Web-based instruction and provide opportunities for reflection, critical thinking, and problem solving. Access to instructor and fellow students is very important for feedback on homework assignments, questions, and revisions on papers (Moore & Kearsley, 1996).

Student Demographics

Higher education's student demographics are rapidly changing. The Student makeup based on students who are presently coming of age and entering the higher education market has changed. The youth of today use the Web as a means for communication and expression (The Power of the Internet for Learning, 2000). As the student population at institutions of higher education diversifies, there will be a critical need to understand the needs of the individual learner (Benke, Bishop, Thompson, Scarafiotti, & SchWeber, 2004). According to Benke et al., differences among the Baby Boomer generation, Generation X, and Millennial students are more pronounced in the digital learning environment. The Baby Boomer generation is comprised of people born between 1946 and 1964, while the Generation X population are those individuals born from 1965 to1980. Last, Generation Y, also known as the 'Millennial Generation', is born from 1980 to 1994.

Digital Natives

While online learners need convenient student support services, satisfaction with such services may vary according to the student's generation as well as with the

particular student's goals. Digital natives are the Generation X and Millennial student population who were raised with computers plus the Internet (Benke et al., 2004). Prensky (2001b) coined the term 'digital native' to describe these students because they are native speakers of technology, fluent in the digital language of computers, video games, and the Internet. They also prefer to use convenient and high-touch types of support, such as advising over the telephone combined with access to the Web (Benke et al., 2004).

Digital Immigrants

Digital immigrants are those who grew up without digital technology and had to adapt to it later in their lives (Are You a Digital Native, 2008). They tend to have a rather moderate level of comfort with digital tools. Digital immigrants are characterized as either resisting technological changes or being slower to adapt. Digital immigrants often speak a different language in reference to technology (Prensky, 2001a). For example, a digital native might refer to their new "camera"; however, a digital immigrant might refer to their new "digital camera" (2008).

The ubiquitous use of Web-based/online technology by today's college students places a demand upon institutions of higher learning to supply their academic communities with easy online access to information because students seek access to the Web for academic advising, course descriptions, current events, and sending e-mail to professors (Benke et al., 2004). Research shows that students do not prefer classroom instruction to web-based instruction (Allen, Bourhis, Burrell, & Mabry, 2002). According to one student, "Taking a course via the Internet eliminated a commute and allowed

freedom to complete coursework within my time constraints. Working fulltime affects my ability to take courses with the long commute" (Moore & Kearsley, 1996, p. 242).

For the most part, their decisions are usually based on flexibility, convenience, and access. Students also prefer the enhanced interaction and educational quality that an online course can offer (Harasim, 2000). For some students, just being able to gain access to educational programs from any geographic location has meant that they could participate in programs that would have literally been outside their reach (Bollinger & Martindale, 2004). All of the aforementioned reasons equate to student satisfaction.

According to Bolliger and Martindale (2004), student satisfaction can be defined as "the students' perception pertaining to the perceived value of the education they received while attending an education institution" (p. 62). The researchers cited that high levels of student satisfaction result from numerous factors: convenience of access, administrative, instructional, and technical support, course quality and opportunities for personal interaction (Benke, Bishop, Thompson, Scarafiotti & SchWeber, 2004). Sener and Hubert (2003) reported that student satisfaction should be interpreted as a blend of meeting the student's needs, meeting unexpressed needs, and faculty expectations.

According to Garrison and Cleveland-Innes, flexibility, convenience, time, and place independence will be initial considerations of student satisfaction. These considerations will be sustained through a satisfying and successful learning experience (2004). Web-based learning environments provide a high level of satisfaction and interaction (Rovai, 2002); however, there is still tremendous challenge to provide students with what they need and not just what they want. Social interaction and collaboration in learning environments lead to positive learning outcomes (Angeli,

Valanides & Bonk, 2003). Collaborative learning tools such as threaded discussion, chat functions, e-mail, digital audio and video files and web pages can improve student satisfaction in the Web-based learning environment (Gunawardena & Zittle, 1998). According to Bollinger and Martindale (2004), this type of social interaction environment can create meaningful learning experiences.

Course management systems such as WebCT offer professors the opportunity to integrate many instructional tools and multimedia into a single management system. Some professors have even developed their own web pages. Researchers have discovered that communication software that increases quality of instruction and raises students' level of motivation is due to greater access to their instructors and their increased satisfaction with outcomes (Bollinger & Martindale, 2004). Finally, community or a sense of community has been shown to be a significant factor in student satisfaction. Having a sense of community provides the support to work together and challenge one another (Davie & Wells, 1991).

Demographic Factors that Influence Students' Attitudes toward Technology

In today's university campus, students demand that they be guaranteed access to computer technology and also expect to encounter the integration of computer technology into the college instructional and learning experience (Sanders, Shetlar, & Morison, 2001). Student attitudes toward computers are highly important in influencing the future use of computers in instructional settings; therefore, attempts have been made to assess students' overall attitude toward computers. Gender, age, major course of study, student perception of proficiency, and prior computer experience are some of the factors found to

influence student attitudes toward computers (Green, 1996b; Hunt & Bohlin, 1993; Mchanney, 1998; & Young, 2002).

Age

Studies by Price and Winiecki (1995) and Smith and Necessary (1996) showed that the variable age was not a significant predictor for student computer technology proficiency. However, Hunt and Bohlin (1993) did find small significant differences by age for computer programming, word processing, and use of the Web. In a later study, Russell et al. (2000) discovered how a students' possession of computer technology skills appeared to be related to age, as younger students had more skills than older teachers did.

Gender

Understanding gender differences and how such differences affect a student's attitude toward learning new computer technologies is extremely important. Much of the early research on gender differences in use of computer technology only sought to identify predictors as to why males were more dominant in the field of computer technology and why they were better made to feel comfortable in using such technology (American Association of University Women, 2000). During the 1980's and very early 1990's, as computers began to evolve, they were primarily viewed as sources of recreation. Males were more willing to embrace this technology and became more comfortable with playing computer games and programming, while females saw computers as merely a tool to accomplish a task, such as word processing, communicating via the internet, and conducting other computer related duties (Miller, Shchweingruber, & Brandenberg, 2001).

Current research shows that the digital gap is beginning to narrow in tandem with confidence levels between men and women beginning to narrow (Miller, Shchweingruber, & Bradenburg, 2001). A study conducted by the NITA (2000) showed how in 1998 females made up 31.2% of all internet users and males made up 34.1% of users. However, by the year 2000, these numbers increased to 44.6% for men and 44.2% for women. Finally, the latest study produced by the Economics and Statistical Administration (2002) show that women and men's rates are almost indistinguishable: men made up 53.9% and women made up 53.8% of all internet users.

Researchers have noted the existence of a gender gap in computer use and proficiency, especially subsequent to instructional technology in different workplaces and computer-related attitudes, perceptions, and values. Although Sanders and Shetlar's (2001) study showed that women have more positive attitudes towards Web-based instruction (2001), earlier studies produced no significant relationships between sex and computer usage and proficiency (Hunt & Bohlin, 1993; Price & Winiecki, 1995).

Major course area

According to Bergen (2003), computer technology should be used as a tool for instruction and learning in all subject areas—education, math science, arts, humanities, and social sciences. Based on a multi-disciplinary study of pre-service teachers' computer technology skills, they pointed out that subject areas were the most significant factor influencing whether students used computer technology in classroom teaching. For example, in some subject areas, pre-service teachers only learned the use of one or two computer technologies; while they may use the technology frequently, they do not have a wide repertoire of computer technology use (2003).

Students' perception of computer proficiency

Prior research has shown that student computer proficiency is a strong indicator of their attitudes toward computers as well as their computer usage (Dyck & Smither, 1994; Thompson, Higgins, & Howell; 1994; & Whitley, 1997). As technology becomes such a vital element in the structure of society, computer skills have become a significant factor in the economic advancement of society (Miller, Chaika, & Groppe, 1996). For education, instilling students with sufficient computing skills is essential. According to Eisenburg (2003),

> It is clear and unambiguous: today's students need to be proficient computer users. Students need to be "computer literate" or even better, "computer fluent". Furthermore, there is a growing awareness that being computer literate is more than simply being able to operate a computer. Students need to be able to use technology for a purpose, flexibly and creatively. (p.13)

Summary

This chapter reviewed and discussed literature on the various elements of Web-based education in the categories of course design, instruction, and delivery. The history of distance learning was discussed to provide a foundation for this research, along with comparison studies between distance learning and face-to-face instruction, and the motives for accelerating beyond this type of comparative research to a more focused study on the quality and effectiveness of Web-based/online learning. Assessment rubrics that have been created to review course design and instruction for quality and effectiveness were also discussed to provide a framework for how participants were selected. These tools also examined perceptions and beliefs of participants and whether

they believe they could perform better in a Web-based environment than in a face-to-face classroom. Finally, research and discussion involving the authenticity of the Web/online environment and which elements of the environment create more effective and successful learning environments were presented. Chapter three will present the methodology for the study.

CHAPTER III

METHODOLOGY

Nature of the Study

Many believe that faculty should redesign course content to take advantage of the unique characteristics of the Web-based learning environment, which include the ability of students to participate in a learning environment that is learner-centered, flexible, and can accommodate for learner differences. This study expands the existing body of knowledge on distance learning and will employ quantitative techniques to investigate students' perceptions of the quality of courses delivered through synchronous and asynchronous distance delivery media. Students' perceptions of course delivery via these media are compared to face-to-face instruction. The researcher focused on students using synchronous internet technology that incorporates two-way audio and video. The researcher compared student perceptions of course quality between synchronous online instruction with voice (SOIV), asynchronous online instruction, and face-to-face instruction.

This chapter describes the research method used to study student perceptions of effective learning environments in Web-based instruction. This chapter is divided into the following sections: (a) research design and analysis, (b) participants, (c) ethical protection of participants, (e) instrumentation, and (f) procedure.

Research Design and Analyses

This study employed a quantitative research design. A multiple linear regression tested the hypothesis that there is a statistical significant relationship between the independent variable student demographics (gender, age, major course of study) and

student proficiency (dependent variable) in the use of computer technology such as spreadsheets, word processing, slideshows, statistical programs, chat, programming, online course design, and threaded discussion.

Next, a Repeated Measures ANOVA test was conducted to determine if there was a significant difference in how students rated their experiences using face-to-face instruction, asynchronous online instruction, and synchronous online instruction with voice. Last, a multivariate analysis of variance (MANOVA) tested the hypothesis that there is a statistically significant difference between males and females involving the degree to which they perceived that course quality could be achieved through synchronous online instruction with voice (SOIV), asynchronous online instruction, and face-to-face instruction. The .05 alpha level was used in all hypothesis testing.

Participants

The researcher was interested in possible differences within graduate and undergraduate students groups enrolled in public four-year institutions of higher learning. These differences were based on age, gender, and major course of study. There researcher did not target any particular age groups for the study. The internet was used to search university departments in the South Central region of the United States where course instruction was delivered via synchronous and asynchronous online media. The researcher's primary interest was universities within a 200 mile radius from his own home institution of learning. The researcher found four-year universities where courses were offered using synchronous online technology. Nine of the universities were located in Louisiana, Mississippi, Alabama, and Tennessee; however, one was located in the state of Maryland. The university located in the state of Maryland was referred to the

researcher. The researcher used e-mail to forward a description of the proposed study and IRB consent forms from the University of Southern Mississippi to 17 department chairs and faculty from five major disciplines: Education, English, Engineering, Science, Liberal Arts. However, the researcher received confirmation from only 11 of the 17 department chairs and faculty from five of the ten selected universities. These department chairs and faculty represented the aforementioned three disciplines—Education, English, and Science.

The researcher disseminated about 200 surveys for the study. A breakdown of the number of surveys sent out follows:

1. 20 surveys were administered at Deep South University A
2. 20 surveys were administered at Deep South University B
3. 45 surveys were administered at Deep South University C
4. 30 surveys were administered at Deep South University D
5. 85 surveys were administered at High North University

Of the 200 surveys, 100 were returned, hence yielding a 50% response rate. Previous literature clearly shows that this response rate is very appropriate for such studies (Matz, 1999). A breakdown of the respondents follows, ordered by institution and major course of study followed:

The following are the responses by institution:

1. 20 from Deep South University A;
2. 10 from Deep South University B;
3. 10 from Deep South University C;
4. 30 from Deep South University D;

5. 10 from Deep South University E;

6. 20 from High North University.

The following are the responses by major course of study:

1. 41 from Education;

2. 4 from English;

3. 13 from Sciences;

4. 42 from Other.

The following are the responses by gender:

1. 37 Males;

2. 63 Females.

The following are the responses by degree level:

1. 93 Graduate;

2. 3 Undergraduate.

More details on the demographics of the respondents are presented in the "Results" section of this dissertation in Chapter 4.

Ethical Protection of Participants

Participation was on a voluntary basis. The students were given a brief description of the study. The study was carried out under the ethical guidelines of the university's Institutional Review Board (IRB) (Appendix A).

Instrumentation

Ward, Peters, & Shelley's (2007) Opinions of Users of Synchronous Interactive Online Instruction (SIOI) survey (Appendix B) was used to query respondents/students on:

1. Demographic characteristics (questions # 1-10).
2. Computer proficiency (question #11 a-h).
3. Individual ratings of dimensions of effective learning environments based on their experiences using SOIV, asynchronous online instruction, face-to-face instruction, and other distance delivery media. These dimensions were adapted from Chickering and Gamson's (1987) seven principles of effective college instruction (questions #20 a-n). As mentioned earlier the Chickering and Gamson study's framework is useful as a gauge of effective instruction, however, some caution needs to used with interpretations about its application to graduate courses.

Permission was granted (Appendix C) to the researcher to use an adapted version of their survey.

The researcher evaluated the validity and reliability of the adapted instrument. He was assisted in doing so by a professor at another university who has done much work in the area of instructional technologies and student learning. Hence, there were additional checks on the validity and reliability of the instruments. The term validity means, "the extent to which any measuring instrument measures what it is intended to measure" (Carmines & Zellar, 1979, p. 17).

For this study, content validity was examined. Content validity examines the degree to which the sample of items or questions on an instrument includes all major elements relevant to a construct being measured. Therefore, the purpose of content validity is to assess whether items adequately measure a construct of specific interest (Crocker & Algina, 1986). For this study, the domains of the construct were determined

through a critical review of literature. These constructs include: (a) computer technological proficiency, (b) ease of use of technology, and (c) quality instruction.

Reliability is the degree of consistency with which the survey instrument measures the same way each time it is used for a research study and under the same condition with the same subjects. Reliability is the internal consistency of the measurement (Polit & Hungler, 1999). Internal consistency is very much of interest to the researcher in this study. According to Ferketich (1990), an alpha coefficient above .70 would be considered an acceptable value to judge internal consistency.

During the pilot phase of this study, questionnaires were administered to 30 graduate students majoring in education at Deep South University A. The students were enrolled in a synchronous online course. The researcher sent out a letter asking the course professor for permission to conduct the study online with students. There was no direct contact made by the researcher to students. Students had the option of either e-mailing their responses or sending responses out by e-mail.

A Cronbach alpha coefficient was computed to indicate the internal consistency of the total instrument. The full-scale reliability for questions #11a-h, #20a-n ranged from .770 to .980. Question #11 reported a Cronbach's alpha of .79 and question (#20a-n) reported Cronbach's alphas of (.877, .769, .868, .980) (See table 1). All of the aforementioned scores were highly reliable.

Table 1

Variables

Variable	Questions	Cronbach's alpha
Proficiency in use of Computer Technology	11a-11h	0.79
Course quality met through SOIV	20a-20n for SOIV	0.88
Course quality met through Asynchronous instruction	20a-20n for Asynchronous online instruction	0.77
Course quality met through Face-to-face instruction	20a-20n for Face-to-Face instruction	0.82
Course quality met through Other distance delivery	20a-20n for Other distance delivery media	0.98

Procedure

The researcher received dissertation committee approval for further study during the Spring semester of 2008. The researcher applied and received permission to conduct the study from The University of Southern Mississippi's Institutional Review Board (IRB) (Appendix A). After IRB approval, the researcher conducted a pilot test to obtain required reliability statistics. As previously mentioned, the researcher used e-mail and telecommunications to select 10 four-year public universities within the states of Louisiana, Mississippi, Alabama, Tennessee, and Maryland to solicit permission from department chairs and faculty to conduct the study. Maryland, although an outlier, was

chosen for further validation of the study outcomes such that one could make more generalizable inferences than if it were not included. The 10 institutions were chosen because all offer courses using synchronous, asynchronous and face-to-face instruction. With the exception of Maryland, all regions included were conveniently located within a 150 mile radius from the researcher.

The participants for the study were e-mailed a packet which included a Cover Letter , IRB approval, and Informed Consent. The chairs did not give the researcher any student contact information. The researcher explained to both instructor and students in the cover letter that the survey/instrument was designed to examine their perceptions of four learning environments (SOIV, asynchronous online, face-to-face, and other distance delivery media) and compare the various degrees to which students perceive that course quality criteria are achieved through each learning environment. The researcher organized prospective participants by their respective school's name listed alphabetically. Each participant was assigned a numerical code to maintain a degree of confidentiality. Students from all participating universities were informed that participation would be based on voluntary efforts, confidential, and would involve approximately 20 minutes of their time. Completed instruments must be e-mailed to the researcher once completed. The researcher conducted statistical testing according to the research hypotheses outlined in this study.

Summary

A quantitative study was used to investigate students' perceptions of the quality of courses delivered through synchronous, asynchronous, and face-to-face instruction. A multiple linear regression was used to test the hypothesis that there is a statistical

significant relationship between student demographics (gender, age, major course of study) and student proficiency in the use of computer technology such as spreadsheets, word processing, slideshows, statistical programs, chat, programming, online course design, and threaded discussion.

Next, a Repeated Measures ANOVA test was conducted to determine if any significant differences existed among student perceptions regarding the degree to which they perceive course quality is achieved through synchronous online instruction with voice (SOIV), asynchronous online instruction, and face-to-face instruction. Last, a multivariate analysis of variance test (MANOVA) tested the hypothesis that there was a statistically significant difference between males and females pertaining to the degree to which they perceived that course quality was being met through synchronous online instruction with voice (SOIV), asynchronous online instruction, and face-to-face instruction.

CHAPTER IV

RESULTS

Introduction

The primary purpose of this research was to assess student perceptions of Web-based instruction. The researcher investigated different elements of effective learning environments and used an adapted version of Ward, Peters, & Shelley's (2007) Opinions of Users of Synchronous Interactive Online Instruction (SIOI) survey to query respondents/students on:

1. Demographic characteristics.
2. Computer technological proficiency.
3. Individual ratings of dimensions of effective learning environments based on their experiences using SOIV, asynchronous online instruction, face-to-face instruction, and other distance delivery media. These dimensions were adapted from Chickering and Gamson's (1987) seven principles of effective college instruction.

Chapter 4 introduces the descriptive statistics and statistical analyses used for the study. The descriptive statistics describe the sample demographic data, followed by standard deviations and means, to describe all group statistics. Last, using statistical analyses the researcher made inferences regarding whether or not a relationship exists between the selected independent and dependent variables. The independent variables used in the study are: (a) graduate and undergraduate students, (b) males and females, and (c) student demographics of sex, age, major course area of study, and classification. The dependent variables are course quality met through SOIV, asynchronous online

instruction, face-to-face instruction, and computer technological proficiency. Both descriptive and statistical test analyses were conducted using the SPSS version 16.0.

A Multiple Linear Regression was conducted to determine if a statistical relationship existed between student demographics and computer technological proficiency. Next, a Repeated Measures ANOVA was conducted to determine if there were any significant differences between synchronous online instruction with voice (SOIV), asynchronous online instruction and face-to-face instruction. Last, a One-Way MANOVA was conducted to determine if there was a significant difference between how male and female students perceived course quality in courses using synchronous online instruction with voice (SOIV), asynchronous online instruction, and face-to-face instruction.

Analysis of Data

Descriptives

Analyses of frequencies and descriptives (see table 2) were conducted on data generated from 100 students, graduate and undergraduate, from four-year universities. More than half of the 100 respondents (63%) were females while men made up 37% of the respondents. Thirty-seven percent of the respondents were between the ages 26-35 years of age and twenty-three percent, were between the ages of 18-25. Fourteen percent of the respondents were between the ages of 36-45 years of age. Twenty-one percent of respondents were between the ages of 46-55 years of age while the remaining 5% were in the 56-75 age group. Forty-one percent of the respondents were education majors; 59% were from other majors. Of the later group, English majors comprised 4%, and science and technology majors made up 13% of the sample population.

Table 2

Frequency and Percentage Distribution for Sample

Variable	Frequency	Percent
Sex		
Male	37	37.0
Female	63	63.0
Age		
18-25	23	23.0
26-35	37	37.0
36-45	14	14.0
46-55	21	21.0
56-75	5	5.0
Major		
Education	41	41.0
English	4	4.0
Science	13	13.0
Other	42	42.0

The study sample included 93% graduate students, 3% undergraduate students, and the remaining 4% was missing data (see table 3). Students were enrolled as either full or part time graduate or undergraduate student; 3% were undergraduate. Fifty-three percent of students were classified as fulltime students and 38% were part-time students.

Table 3

Classification and Enrollment Status

Variable	Frequency	Percent
Classification		
Graduate	93	93.0
Undergraduate	3	3.0
Missing	4	4.0
Enrollment status		
Full time	57	57.0
Part time	38	38.0

Twenty-one percent of students reported that they had never been enrolled in an online class, while 23% of students reported that had been previously enrolled and completed 1-2 online courses. Another 23% of students sampled for the study reported that they had completed 3 to 5 online classes. In addition, 23% more students reported to have completed 3 to 5 online classes, while 23% more students reported that they had completed 6 or more online courses. The remaining 10% was missing data (Table 4).

When respondents were asked about what type of online course they had completed, (63% of respondents reported to have been enrolled in a synchronous based online class before. In addition, 11% of students reported to have completed instruction in an asynchronous based course. Last, 26% of students left this item blank.

Table 4

Number of online courses completed and type of online course completed

Variable	Frequency	Percent
# of online courses completed		
None	21	21.0
1-2	23	23.0
3-5	23	23.0
6 or more	23	23.0
Missing	10	10.0
Type of online course completed		
Synchronous	63	63.0
Asynchronous	11	11.0
Missing	26	26.0

Students were asked to describe their computer skills based on a 5-part Likert type scale, 1 being unskilled, 2 being somewhat skilled, 3 being average, 4 being above average, and 5 being outstanding skills. Most students rated themselves as proficient in using spreadsheets, PowerPoint, conducting online research, using chat/thread discussions, and word processing; however, most students described themselves as below proficient in computer programming and Webpage design (Table 5).

Table 5

Means and Standard Deviations for student computer/technical skills

Variable	*Mean*	*SD*
Wordprocessing	4.07	0.8
Spreadsheet	3.32	1.0
PowerPoint	4.13	0.7
Online research	4.07	0.8
Chat/thread discussion	4.20	1.2
Statistics programs	3.73	1.0
Programming	4.47	1.1
Webpage design	4.40	0.9

Note. The scale is as follows: 1 being unskilled, 2 being somewhat skilled, 3 being average, 4 being above average, and 5 being outstanding skills.

For the second research question, the researcher sought to determine how students perceived course quality instruction when enrolled in a course using a synchronous online with voice format, asynchronous online format, and face-to-face instruction. The following paragraphs describe the descriptive results from the study.

Respondents were asked to rate their perceptions of course instructional quality after receiving instruction in a synchronous, asynchronous, and face-to-face instructional medium (Tables 6-8). The scale used is 1 to 5, with 1 being the lowest rating and 5 being highest. Students were to circle the number beneath each course format that corresponds to their rating for that format's quality relative to each dimension.

Most students rated their experiences using synchronous online courses as "fair" under the dimensions of: "encouraging student faculty contact," "encouraging active learning among students," "emphasizing time on task," "respecting diversity," "minimizing cost other than tuition," engagement with the instructor," "engagement with other classmates," "motivation during course completion," "motivation after course completion," and "mastery after course completion." However, students perceived the dimensions of "encouraging cooperation among students," "providing prompt feedback from students," and "ease of access to the course" to be of low quality.

For courses delivered using an asynchronous format, student ratings were higher. Students gave higher than average ratings based on their perceptions of quality course instruction to three of the dimensions: "encouraging student faculty contact," "emphasizing time on task" and "minimizing costs other than tuition." The following were given a fair rating by students: "Encouraging cooperation among students," "encouraging active learning among students," "communicating with expectations," "respecting diversity," "ease of access to the course," "engagement with the instructor," "engagement with other classmates," "motivating during course completion" and "motivating after course completion." Finally, students were asked to rate a course based on letter grades. When given course instruction in a face-to-face environment students were asked to rate course quality. Students gave higher than average ratings based on their perceptions of quality instruction.

Table 6

"SOIV" Student Ratings of Instructional Quality under the Following Dimensions

Variable: Synchronous Online Instruction with Voice (SOIV)	N	*Mean*	*SD*
"Student Faculty Contact"	94	3.4	1.4
"Encouraging cooperation"	95	2.8	1.4
"Encouraging active learning"	92	4.0	1.3
"Providing prompt feedback from student"	87	3.0	1.3
"Emphasizing time on task"	90	3.2	1.4
"Communicating high expectations"	92	2.8	1.3
"Respecting diversity"	94	3.8	1.4
"Ease of access to the course"	87	2.9	1.4
"Minimizing cost other than tuition"	96	3.4	1.4
"Engagement with the instructor"	85	3.2	1.2
"Engagement with other classmates"	94	3.9	1.2
"Motivation during course completion"	90	3.3	1.3
"Motivation after course completion"	96	3.8	1.1
"Mastery after course completion"	93	3.2	1.1

Note. The scale is a follows: 1= lowest rating to 5= highest rating.

Table 7

"ASYN" Student Ratings of Instructional Quality Under the Following Dimensions

Variable: Asynchronous Online Instruction	N	*Mean*	*SD*
"Student Faculty Contact"	94	4.05	0.9
"Encouraging cooperation"	89	3.03	1.3
"Encouraging active learning"	95	3.40	1.4
"Providing prompt feedback from student"	92	2.73	1.4
"Emphasizing time on task"	91	4.02	0.9
"Communicating high expectations"	88	3.32	1.2
"Respecting diversity"	95	3.84	1.4
"Ease of access to the course"	91	3.30	1.3
"Minimizing cost other than tuition"	92	4.31	0.8
"Engagement with the instructor"	87	3.00	1.2
"Engagement with other classmates"	96	3.51	1.3
"Motivation during course completion"	94	3.40	1.3
"Motivation after course completion"	89	4.00	0.9
"Mastery after course completion"	87	3.00	1.4

Note. The scale is a follows: 1= lowest rating to 5= highest rating.

Table 8

"F2F" Student Ratings of Instructional Quality Under the Following Dimensions

Variable:	N	*Mean*	*SD*
Face-to-face Instruction			
"Student Faculty Contact"	94	3.8	1.4
"Encouraging cooperation"	95	3.7	1.3
"Encouraging active learning"	92	3.6	1.3
"Providing prompt feedback from student"	87	3.5	1.4
"Emphasizing time on task"	90	3.4	1.4
"Communicating high expectations"	92	3.5	1.3
"Respecting diversity"	94	3.4	1.4
"Ease of access to the course"	87	3.0	1.3
"Minimizing cost other than tuition"	96	3.4	1.5
"Engagement with the instructor"	85	3.0	1.7
"Engagement with other classmates"	94	3.8	1.4
"Motivation during course completion"	90	3.1	1.4
"Motivation after course completion"	96	3.5	1.1
"Mastery after course completion"	93	3.2	1.3

Note. The scale is a follows: 1= lowest rating to 5= highest rating.

Statistical Test Results

Statistical tests for each hypothesis were performed. These analyses yielded results as follows:

H_1: There is a statistically significant relationship between student demographics (gender, age, major course of study) and students' self-perceived proficiency in the use of computer technology such as word processing, spreadsheets, slideshow, online research, chat/threaded discussion, statistics programming, and online programming. A multiple regression was conducted to analyze the hypothesis using a significance level of .05 to determine a statistical significant relationship. There was not a statistically significant relationship between student demographics and student computer technological proficiency. Results from a multiple regression test ($F(9, 90) = .916$, $p=.516$, $R^2= .08$) showed that that there is no statistically significant relationship between student demographics and computer technological skills; therefore, hypothesis 1 was rejected.

H_2: There is a statistically significant difference among student perceptions regarding the degree to which they perceive that course quality is achieved through synchronous online instruction with voice (SOIV), asynchronous online instruction, and face-to-face instruction. A Repeated Measures ANOVA was conducted to analyze the hypothesis using a significance level of .05 to determine if a statistically significant difference existed. Results from the F test, $F(2, 98) = 5.187$, $p= .007$, revealed a statistically significant difference existed between students' perceptions of instructional quality when engaged in synchronous online instruction with voice and asynchronous online instruction and face-to-face instruction. A post-hoc (LSD) test was conducted by the researcher. Results showed a statistically significant difference between asynchronous and synchronous online instruction. There was no statistically significant difference between face-to-face instruction and synchronous online instruction or asynchronous online instruction and face-to-face instruction. Results from Table 9 show that students

would prefer using asynchronous online learning rather than synchronous online instruction with voice.

Table 9

SOIV, ASYN, and F2F Means

Variable	Mean	SD
SOIV	3.34	0.61
Asyn	3.51	0.57
F2F	3.44	0.56

Note. High preference mean = 3.51; low preference mean = 3.34.

H_3: There is a statistically significant difference between males and females involving the degree to which they perceive that course quality is achieved through SOIV, asynchronous online instruction, face-to-face instruction, and other media delivery. A One-Way MANOVA was conducted to analyze the hypothesis using a significance level of .05 to determine if a statistically significant difference exists. Results from the test revealed no significant difference by gender ($F(2, 97) = 2.460$, $p=.091$). Last, there was no significant interaction between gender and face-to-face instruction ($F(1, 98) = .148$, $p= .701$).

H_4: There is a statistically significant difference between graduate and undergraduate students regarding the degree to which each perceive that course quality criteria are met through (SOIV), asynchronous online instruction, and face-to-face instruction. Hypothesis four was dropped from the study due to the small number of responses from undergraduate students.

Summary

Chapter IV presented both the descriptive statistics and statistical test results from the analysis of survey responses provided by the sample utilized for this study. The sample was comprised of students from five four-year institutions of higher learning. There were 200 surveys distributed; 100 were returned, yielding a 50% return ratio. A multiple-linear regression analysis was performed to look for any statistically significant relationships among students' demographics (age, race, gender) and proficiency within computer technology. Results revealed no statistically significant relationships between computer technological proficiency and student demographics. Next, a one-way MANOVA was conducted to determine if there was a statistically significant difference between males and females' perceptions of quality instruction against the dimensions of synchronous online instruction with voice, asynchronous online instruction, and face-to-face instruction. Results from the MANOVA test revealed no statistically significant differences based on gender. Finally, a repeated measures design was used to find statistically significant differences among student perceptions regarding the degree to which they perceive that course quality is achieved through SOIV, asynchronous online instruction, and face-to-face instruction. Results from the repeated measures design test revealed a statistically significant difference between synchronous and asynchronous online instruction but no statistically significant differences were found between synchronous online instruction with voice and face-to-face instruction well as between face-to-face instruction and asynchronous online instruction. These results show that if students are given the option to choose between synchronous online instruction with

voice and asynchronous online instruction, student would prefer to receive instruction using an asynchronous online environment.

CHAPTER V

DISCUSSION

Introduction

In this study student participants gave their perspectives on the relative capacities of three modes of instructional delivery (synchronous online instruction with voice, asynchronous online instruction, and face-to-face instruction) to address dimensions of instructional effectiveness. The study sought to find differences based on gender and classification. Last, the study sought to determine if any statistical significant relationships existed between student demographics and computer technological proficiency. Results showed no statistically significant relationship among student demographics and computer technological skills. Next, there was a statistical significant difference between students' rating of quality instruction when given a preference between synchronous online instruction with voice and asynchronous online instruction. Last, there were no significant differences regarding students' perceptions of quality instruction based on gender.

The researcher investigated different elements of effective learning environments and used an adapted version of Ward, Peters, & Shelley's (2007) Opinions of Users of Synchronous Interactive Online Instruction (SIOI) survey and queried respondents/students on:

1. Demographic characteristics.
2. Computer technological proficiency .
3. Individual ratings of dimensions of effective learning environments based on their experiences using SOIV, asynchronous online instruction, face-to-face

instruction, and other distance delivery media. These dimensions were adapted from Chickering and Gamson's (1987) seven principles of effective college instruction.

Chapter 4 introduced the descriptive statistics and statistical analyses used for the study. The statistical tests used in the study were Multiple Linear Regression, Repeated Measures ANOVA, and one-way MANOVA. A Multiple Linear Regression was used to determine if a statistical relationship exists between student demographics and computer technological proficiency skills. Next, a Repeated Measures ANOVA was used to find any significant differences between student's ratings of quality instruction among the instructional modes of synchronous, asynchronous, and face-to-face learning environment. Next, a One-Way MANOVA was conducted to investigate whether there were any significant differences between how male and female students perceive course quality in courses using synchronous online instruction with voice, asynchronous online instruction, and face-to-face instruction. Due to a small number of returned survey instruments from graduate students, hypothesis four was dropped from the study.

Discussion of Findings

Research question 1 sought to determine if there was a statistically significant relationship between student demographics and students' self-perceived proficiency with computer technology. Previous studies (Pope-Davis & Twing, 1991; Price & Winiecki, 1995; Smith & Necessary, 1996) all showed that the variable age was not a statistical significant predictor for student computer technology proficiency. Consistent with these studies, the researcher discovered no statistically significant relationship between age and computer technology proficiency in the study. In contrast to these findings, the studies

from Marcinkiewicz (1994), and Hunt and Bohlin (1993) found a significant relationship between age and computer technological proficiency.

These findings strongly confirms the need to have based this study on Moore's learning theories that put the learner and his or her interaction with others at the center of the learning process, as opposed to putting demographics as the basis of learning. Just like any sound academic theory, this study's findings (based on Moore's work) is not consistent with the work of other scholars such as Bergen (2003). In Bergen's study, a multi-disciplinary study was conducted to assess student' computer technological skills. Bergen discovered that the most statistically significant factor influencing whether students used computer technology was their subject areas. The Bergen study accounts for how a student's consistent use of computer technology appear to raise the level of their computer technological skills.

Research question 2 sought to find statistically significant differences among student perceptions regarding the degree to which they perceive course quality can be achieved through SOIV, asynchronous online instruction, and face-to-face instruction. Results from the study reveal that students would prefer receiving course instruction in an asynchronous learning environment to receiving instruction in a SOIV learning format. Results also showed that students had no preference between a synchronous and face-to-face learning environment as well as an asynchronous and face-to-face learning environment. Students seem to be more satisfied using an asynchronous learning format as compared to a synchronous online with voice learning format. The finding is similar to Meyer's research (2003) where students expressed more satisfaction using asynchronous online instruction with a synchronous based environment. The researcher's finding could

easily be attributed to the fact that synchronous online instruction with voice is a relatively new technology. Most of the student participants in Meyer's study had never been enrolled in a course using synchronous online technology and were not as readily receptive to adapting to new computer technology as other students were. These findings run counter to Ward, Peters, & Shelley's study (2007) where students had a greater preference for synchronous online instruction with voice as compared to asynchronous online instruction. According to the researchers, this finding suggests that it is possible for an instructor to achieve levels of effectiveness in an online/web-based learning environment that are similar to what is gained from face-to-face delivery. Studies that include this type of analysis are few in number, so comparisons with other studies are at best tentative.

Research question 3 sought to determine if there was a statistically significant difference between males and females relative to the degree that they perceived that course quality was met through SOIV, asynchronous online instruction, and face-to-face instruction. Results from the study revealed no statistically significant differences between males and females regarding the degree to which they perceived course quality in synchronous online instruction with voice, asynchronous online instruction, and face-to-face instruction. Again this confirms the researcher's underlying theoretical frameworks where the works of Moore and Kearsley (2005) did not show any linkages between a student's gender and learn ing. In recent years, discussions on gender in technical areas such as engineering and information technology have yielded similar findings, albeit the historical view that men learn different from women. However, some studies (Busch, 1995; Levin & Gordon, 1989; Kirkup & von Prummer, 1997; Mitra,

LaFrance & McCullough, 2001;Yates, 2001) reported the negative attitudes of women towards computer instructional technology as affecting how women interact with computers. These studies also disclosed low numbers of female students entering computer technology professions. Finally, Chanlin (1999) and Peter (1995) produced studies that provided evidence that men and women perceived computer instructional technology differently.

Research question 4 sought to determine if there was a statistically significant difference between graduate and undergraduate students regarding the degree to which each perceive that course quality criteria are met through SOIV, asynchronous online instruction, and face-to-face instruction. Question 4 was dropped from the study due to the very small number of undergraduate students who returned their surveys back to the researcher.

Implications for Policy and Practice

Implications from the Analysis

This investigation provided useful information for technology developers (web masters, web programmers, graphic designers, etc)—a group that is often ignored in learning technologies research. The primary purpose of this research was to assess student perceptions of effective learning environments across the dimensions of synchronous online instruction with SOIV, asynchronous online instruction, and face-to-face instruction. The rationale behind this research was based on an assessment of the elements of quality instruction found throughout the dimensions of SOIV, asynchronous online instruction, and face-to-face instruction.

Results from question 1 revealed no statistically significant relationship between student demographics and computer technological skills. These demographics included age, gender, and major course of study. Therefore, when computer software designers design computer instructional interfaces, designers may not need to focus on making such platforms demographic-specific and should focus on other factors. This is an area that warrants further research and was beyond the scope of the current study. University administrators should invest in computer instructional technologies regardless of student major, age, or gender. The reality is, since this is the era of web-based technology, students can greatly benefit from using this technology for learning. For example, in previous studies (Bradley et al., 2007a&b; Lou et al., 2008), have found that students would rather click a link to do further research on a specific topic in their studies than go to the library. Regardless of how much students are encouraged by their professors to use the library, most students will not do so. They would rather "click and read," a phenomenon some have described as encouraging laziness on the part of the students. The researcher strongly holds to the philosophy that students must be given the freedom to learn in line with the current times and not insist that learning must be done as it was in previous decades, when the only option was paper-based learning.

Results from question 2 show that students would prefer asynchronous online learning environments rather than SOIV. Previous research has indicated that students in an asynchronous format have more time to digest information (Belanger & Jordan, 2000; Bollinger & Martindale, 2004; Whiteman, 2002). According to Garrison and Cleveland-Innes (2004), students engaged in an asynchronous online environment have the flexibility to take as much time as deemed necessary to digest new information as they

read. In addition, students have the ability to go back and review videos previously viewed and replay them to comprehend the subject matter. Furthermore, with asynchronous online instruction, the instructor usually goes back to make any needed corrections on the website for students that will eventually visit the site. Hence, information on asynchronous online instruction is usually up-to-date and more complete (Harasim, 2000 ; Rovai, 2002).

Some of the features of synchronous online technology may disclose another reason that students seem to prefer asynchronous online technology over SOIV. Such features of synchronous online technology tend to operate very slowly. This is usually due to poor connectivity based on common bandwidth bottlenecks. Essentially, many online technologies are flooded with video and audio features that operate slowly due to poor connectivity. These very slow operating features that were meant to be captivating to the user become boring. The implication here is the need to address policy to have universal broadband / high-speed bandwidth similar to free access to public radio. One has to be cautioned that such a move will likely draw opposition from large telecommunications companies that generate large portions of their revenues from selling bandwidth.

Results from research question 3 revealed no statistically significant differences between males and females regarding their perceptions of quality instruction. The implication here is universities should seek alternatives to investing in gender sensitive technology. In addition, the computer technology industry should cease allocating millions of dollars each year to marketing technology that is specifically catered to women if further research continues to prove that there are no differences between males

and females' perceptions of quality instruction using synchronous online instruction, asynchronous online instruction, and face-to-face instruction (Mbarika et al., 2003).

Implications for Post-Secondary Education

As was mentioned previously in the results and discussion sections, respondents had an overall appreciation for web-based instruction—whether synchronous or asynchronous. This has additional implications for post-secondary education. University departments and state education policymakers who are involved in the Web-based instruction movement should initiate communications and begin working to shape web-based instruction practices. Such communication will assist educational policy leaders in understanding the unique dimensions of web-based instruction and also foster professional learning communities. Such learning communities are an excellent medium where state education representatives can come together to create dialogue with university and other state educational leaders concerned with top-to-bottom articulation of Web-based instructional policy and practitioners. Universities, state education agencies, and the U.S. Department of Education should collaborate on the fostering of a scientific research agenda related to the use of Web-based instruction for professional development and learning with students in a university online environment (Policy Issues, 2003).

In a study conducted at SUNY, Shea, Swan, Fredericksen & Pickett (2002) discovered that learning and satisfaction were significantly correlated with collaborative feedback, knowledge sharing, and interaction. Garrison (2003) found in his study that collaboration and independence were distinct properties of Web-based instruction. These properties are just a few of the unique elements of web-based instruction which make it

very beneficial to universities. These unique elements are joined by the emergence of digital video and audio technologies that are digitally compressed, manipulated, and transmitted over distributed communication networks. These trends are fueling the promise of web-based instruction as a ubiquitous learning technology.

Limitations

No study is perfect in design or methodology.

1. This study was limited by a small student sample size;
2. This study was limited to primarily graduate students;
3. This study does not measure students' "actual" learning outcomes, only perceived learning at only one point in time;
4. This study was limited to only one assessment tool;
5. This study was not inclusive of students with disabilities;
6. This study did not account for students with different learning styles;
7. Finally, this study uses the Chickering and Gamson's (1987) Seven Principles for Good Practice in Undergraduate Education in Effective Teaching Practices, which is a framework used to understand quality for undergraduate students in a face-to-face learning environment.

Recommendations for Future Research

The results of this study pinpoint several areas that deserve attention in future research. Future research warrants using a national sample size for a more robust study. Replication of this study should occur with a larger sample size that would be more representative of the population under study and would account for more statistically significant differences than those based on chance alone.

Participants in the study were comprised of graduate students. Past research shows that a student's computer technology use and proficiency are functions of their level of college. According to Rubin (2000), as students progress through college, they tend to utilize a greater variety of computer technology and more complex strategies. Therefore, future research should address more of the perceptions of undergraduate students by increasing the undergraduate student representation in the study.

Next, a longitudinal multi-method study that involves a variety of assessment tools to measure students' "perceived" and "actual" learning is needed for further research. Previous studies were entirely based on "perceived" learning (as reported by the students/learners) and did not attempt to measure students' "actual" learning. Further studies should involve the use of a variety of assessment tools (weekly observations, daily eJournals, and, when feasible, pre and post tests) to effectively measure student "perceived" learning and "actual" learning outcome.

Future research should address the perceptions of students enrolled in four-year universities with disabilities. In the hopes of developing better and more efficient computer instructional technology that is highly interactive and engages disabled students, the survey instrument should elicit responses from disabled students.

Next, future research should explore the ability of Web-based instruction to address the different styles of student learning. Despite the fact that the researcher examined the perceptions of students to find whether students were satisfied and were learning using Web-based technologies, the study does not account for students who have different learning styles. Finally, as a basis for future research, the researcher should consider using an alternative framework as a basis for the study. The Chickering and

Gamson (1987) framework is helpful in understanding undergraduate students in a face-to-face environment; however, it would be useful to identify a course quality framework specifically tailored to graduate studies for use in similar research involving graduate students. Further research warrants the need for the development of a grounded theory which clearly provides a framework for best practices in courses for graduate and undergraduate populations in a Web-based learning environment.

Educators should be dedicated to ensuring that students accomplish the necessary skills to engage in synchronous online instruction with voice and asynchronous online instruction. Educators have to be dedicated to understanding how student learning fits into the context of life. For these reasons, as is asserted by many of the authors cited throughout the study, more research is needed in the area of Web-based instruction.

Summary

Chapter 5 discusses all of the pertinent findings associated with analyses of the data. In the discussion section from this chapter the researcher addressed the results from the tested hypotheses. The researcher contrasted findings from past studies with the findings from his research and presented findings which were consistent and inconsistent to his research. Next, the implications for policy and practice were discussed, proceeded by exploration of implications for policy and practice. Last, the researcher presented limitations and recommendations for future research.

APPENDIX A
PERMISSION TO CONDUCT STUDY

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Institutional Review Board

118 College Drive #5147
Hattiesburg, MS 39406-0001
Tel: 601.266.6820
Fax: 601.266.5509
www.usm.edu/irb

HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **28052803**
PROJECT TITLE: **Perceptions of an Effective Learning Environment Across the Dimensions of Synchronous, Asynchronous, and Face-to-Face Instruction**
PROPOSED PROJECT DATES: **06/01/07 to 11/03/08**
PROJECT TYPE: **Dissertation or Thesis**
PRINCIPAL INVESTIGATORS: **Jarrett Landor-Ngemi**
COLLEGE/DIVISION: **College of Education & Psychology**
DEPARTMENT: **Educational Leadership & Research**
FUNDING AGENCY: **N/A**
HSPRC COMMITTEE ACTION: **Expedited Review Approval**
PERIOD OF APPROVAL: **05/28/08 to 05/27/09**

Lawrence A. Hosman

Lawrence A. Hosman, Ph.D.
HSPRC Chair

6-3-08
Date

APPENDIX B
STUDENT SURVEY

1. Course Information:
   a. For which course are you completing this questionnaire? (Enter course number) _____
   b. When did you take this course? Year? ____ Semester? (Spr., Summ., Fall) _____

2. What is your age? ____

3. What is your gender? ____

4. What is your major area of study? _____

5. How many online courses have you taken previously? ____

6. Were any of your online courses real-time, synchronous, with interactive two-way audio? ___

7. Classification
Circle:
   a) Full time b) Part-time
   a) Grad. b) Undergrad

8. Circle the response that applies to you.
   a. What is your highest degree attainment? ___ PHD ___Masters ___BS ___Specialist ____ Other

   b. What is your current professional role? __Teacher
   __ Admin Specify level (elem. middle high other)
   __ Student
   __ Other

9. Have you ever taught an online course before? ___ b) How many?

10. If yes to question #9, which type of online format did you use: **Circle**
   a. (**Asynchronous**--does not have to take place in real time nor require all participants to be online at the same time)
   b. (**Synchronous** --takes place in real time requiring all participants to be online at the same time)

11. Describe your skill level in the following areas:

SKILL	1=Unskilled	2=Somewhat Skilled	3=Average Skills	4=Above Avg. Skills	5=Outstand-ing Skills
a. Word processing					
b. Spreadsheet					
c. Slide show (e.g., PowerPoint)					
d. Online research					
e. Chat/threaded discussion					
f. Statistics programs					
g. Programming					

h. Online course design					

12. Choose and respond to the items below that best describes the choices you made when selecting this course.

a. Describe your reason(s) for choosing a course offered in a synchronous online instructional w/voice (SOIV) format instead of a traditional (face-to-face) format.

_____

b. Describe your reason(s) for choosing a SOIV format instead of one that is offered in another distance delivery format (e.g., asynchronous online format, closed circuit video link connecting instructor/classroom).

_____

13 Choose and respond to the items below.

a. What did you hope to gain before enrolling in this course? _____

b. What did you hope to gain while enrolled in the course? _____

c What do you hope to gain after completing this course? _____

d. What were your greatest concerns before enrolling in this course online?

_____

14. What is your opinion of the following features of a SOIV classroom? (Check appropriate box for each feature.)

FEATURE	0=Not Applicable	1=Strongly Dislike	2=Dislike	3=Neutral	4=Like	5=Strongly Like
a. Orientation to SOIV features						
b. Screen format and visual features						
c. Two-way audio						
d. Chat feature						
e. Instructor's capacity to mark on screen						
f. One-Way video feed from instructor						
g. Application sharing (e.g., movies, website, spreadsheets,)						
h. Student use of control panel						
i. Telephone audio backup						
j. 2-way video						
k. virtual break-out rooms						

15. What did you like best about your overall experience with SOIV as a delivery format for this course?

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16. What additional services(s) or feature(s) would you like to see in the SOIV classroom?

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17. Would you enroll in another course in a SOIV format? Why or Why not?

On a scale of 1 to 5, with 1 being the lowest rating and 5 being highest, what rating would you give to your overall experience with SOIV in this course? _____

19. Would you recommend a course taught via SOIV to others? (Yes, No, Maybe) _____

20. Using the criteria in the table below, compare courses delivered in the following formats:

a. SOIV (Synchronous Online Instruction with Voice) format
b. Asynchronous online format
c. Face-to-face format
d. Other distance delivery format (e.g., closed circuit video link connecting instructor/classroom)

The scale used is 1 to 5, with 1 being the lowest rating and 5 being highest. Circle the number beneath each course format that corresponds to your rating for that format's quality relative to each dimension. It is okay to circle the same rating number on a given dimension if you believe that multiple course formats are equal in quality for that dimension.

DIMENSIONS*	SOIV Format	Asynchronous Online Format	Face-to-Face Format	Other Distance Delivery Format
a. encouraging student-faculty contact	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
b. encouraging cooperation among students	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
c. encouraging active learning	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
d. providing prompt feedback to students	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
e. emphasizing time on task	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
f. communicating high expectations	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
g. respecting diverse talents and ways of learning	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
h. ease of access to the course	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
i. minimizing costs other than tuition	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
j. engagement with the instructor	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
k. engagement with other classmates	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
l. motivation during completion of course	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
m. motivation after completion of course	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
n. mastery of course content	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

*Adapted from Chickering and Gamson's "Seven Principles for Good Practice in Undergraduate Education" (1987).

APPENDIX C

Mr. Jarrett Landor-Ngemi
The Department of Educational Leadership and Research
The University of Southern Mississippi

Dear Jarrett,

Thank you for your interest in the instrument developed by Dr. Kyna Shelley, Dr. Gary Peters, and me in order to glean student opinions concerning synchronous online instructional technologies. We are glad that this topic is the focus of your doctoral dissertation. Please accept this letter as confirmation that you are granted permission to adapt the instrument for use in your research.

In our study of student perceptions of various learning environments, we found the instrument to be very useful. However, in using the instrument, we found that it had some limitations, and I will be happy to discuss what we learned.

As you complete your study, we will be interested in your results. Please accept our best wishes for success with your research.

Sincerely,

Michael E. Ward
Associate Professor of Educational Leadership

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