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STUDENTS' PERCEPTIONS OF WEB-BASED DISTANCE LEARNING COURSES

by

Marsha Kennedy Ham

A Dissertation Submitted to the Faculty of the

CENTER FOR THE STUDY OF HIGHER EDUCATION

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

2002

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As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Marsha Kennedy Ham

entitled Students' Perceptions of Web-based Distance Learning Courses

and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy

Gary D. Rhoades	4/8/02 Date
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	Date

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Dissertation Director Gary D. Rhoades — 4/8/02 Date

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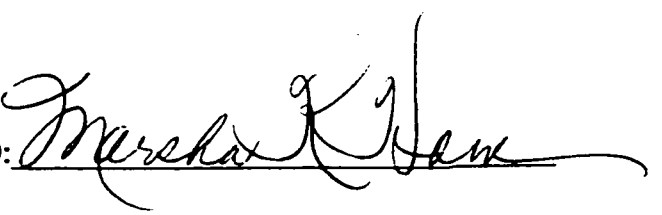
SIGNED: 

ACKNOWLEDGEMENTS

This dissertation is the culmination of a six-year educational endeavor. Without the support and encouragement of many, this journey would not have been possible. I would like to acknowledge the following for their contributions to the process:

Thanks to my committee who generously shared their expertise and provided guidance. Gary Rhoades, dissertation director and director of the Center for the Study of Higher Education; John Levin, professor in the Center for Higher Education; and Suzie Weisband, associate professor in Management Information Sciences.

Special thanks to Barry Richards, who taught me how to create a survey on the Web and provided server space for my study, and to Mark Borgstrom for the many hours of statistical "consultation" and guidance.

Thanks to Don Swoboda for planting the seed and encouraging me to get started on the journey that culminated in the completion of this dissertation. And many thanks to Anita McDonald for making it possible for me to continue my tenure with Extended University as I completed my Ph.D. program at the University of Arizona and for her ongoing support and encouragement.

Many thanks to my friends and colleagues at Extended University for their interest and encouragement – especially Pam Shack, Jovanna Owusu and Erin Kimrey, my cheering squad and support team!

A special thank you to my parents Bill and Berniece Kennedy, who taught me that I could do anything to which I set my mind and dedicated my actions. Although my dad is no longer with us, I know he is proud of me and looks down from on high to check on my progress from time to time. And thanks to my brother Whit, who did not understand why I undertook this endeavor but who has supported me all along the way.

Friends are the family we choose. Many thanks to all my friends for their encouragement and support, especially to Ronna Biesecker, who blazed the Ph.D. trail before me and provided invaluable guidance; to Maryellen Burnett, my spiritual teacher and friend who guided and encouraged me in the good and the challenging times; and to David Short for his long-time friendship and his ongoing encouragement to think outside the box.

Above all, I give thanks to God for blessing me with wonderful friends and mentors, for answering my prayers when they were in my highest and best interest, and for guiding my steps all along the way.

DEDICATION

In memory of Steve Ham, who predicted that one day I would be Dr. Ham long before I could envision it for myself

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ABSTRACT

The purpose of this study was to investigate student satisfaction levels with their web-based learning experience. Study sites were three public Doctoral/Research Universities – Extensive. A cross-sectional, web-based survey collected data from students about their perceptions of satisfaction and success in the two months following completion of their spring 2001 courses. Two hundred sixty-nine (269) students enrolled in 40 graduate-level, web-based courses at the three sites were surveyed. Students were divided into two study groups: completers and non-completers. The survey for course completers covered five major topic areas: experience with computers and the Web, course participation, images of self, perceptions of satisfaction and success, and general information. The survey for non-completers covered two topic areas: general information and factors affecting decision to drop from the course.

Hierarchical regressions revealed significant relationships between satisfaction and self-efficacy and between self-efficacy and interpersonal control at two sites ($p < .05$ and $p < .001$, respectively). Hierarchical regressions also revealed significant relationships between satisfaction and level of communication ($p < .01$ and $p < .05$, respectively). When limiting the definition of available technical support to instructor assistance or help from teaching assistants, there appeared to be a significant relationship between available technical support and students' overall success in their courses ($p < .05$). Students' attitudes about the Web were positively correlated to both their overall satisfaction and success at one site ($p < .05$) while at the second site attitudes toward the Web were positively correlated only to satisfaction with the course ($p < .05$).

No significant relationships were found between students' participation in collaborative learning activities and satisfaction.

The study raises a number of questions related to the relationship of gender to student satisfaction and success and to the relationship of discipline to the structure of the web-based course. Future research can address these relationships to clarify the relationship between students' perceptions of satisfaction and success and the type of learning activities and experiences they encounter in web-based distance courses based on gender and field of study.

INTRODUCTION

This chapter presents an overview of the study, a brief discussion of emerging issues in web-course development, an introduction to the literature reviewed, a brief summary of the conceptual framework and research methods, and an explanation of the purpose and significance of the study.

Overview

The emergence of web-based courses is a relatively new phenomenon with noticeable numbers of web courses only beginning to appear in the educational marketplace in the late 1990's. As an example, the University of Arizona began offering web-based courses in library and information science in 1997. Stanford received a grant from the Alfred P. Sloan foundation in 1995 to begin digitizing video-based engineering lectures for Web delivery. The University of Phoenix also began offering online courses in the mid-nineties. The University of Colorado introduced CU Online in 1996. With the relatively recent entry of web-based courses as distance learning options, researchers have yet to focus on assessment issues and factors relating to student success.

Given the dearth of research, this study was designed to gather and analyze empirical data about student perceptions about web-based learning. The study investigated the relationships between pedagogical approaches, the active-based learning options of the software that were used and the technical support available in graduate level web-based courses and student satisfaction levels and successful completion. The

study also looked at students' self efficacy and interpersonal control profiles to determine how personal efficacy and self control relate to students' perceptions of satisfaction and success. Other areas investigated by the study include student comfort levels with computers and the World Wide Web, the relationship between communication flow and satisfaction, technical support's effect on satisfaction and success, the relationship between participation in collaborative learning activities and satisfaction, and the effect of motivation on persistence.

Issues

In the rush to establish educational courses online, administrators, program developers and instructors have paid little systematic or scholarly attention to what the outcomes actually are for students who take the courses. Increasing interest in the Internet and the Web has stimulated "possibility" thinking for marketing, business and educational opportunities among business people and entrepreneurs. Distance learning has followed this trend with higher education institutions entering into the online learning foray. According to the National Center for Educational Statistics (NCES), 58% of two-year and four-year postsecondary institutions offered asynchronous Internet distance learning courses in 1997-98. Of those institutions, 87% planned to increase the number of asynchronous online courses over the subsequent three years. Seventy-three percent of those institutions planning to start offering distance learning courses within the following three years planned to offer asynchronous web-based courses (Lewis 1999). Clearly, institutions are moving or planning to move into online learning in a significant way.

Initial entry into the web-based course arena by higher education institutions may have been stimulated by a "keeping-up-with-the-Jones" mentality as prestigious institutions such as Stanford concertedly entered the web-based educational market with a wide range of graduate engineering courses. Other institutions followed suit using the Stanford web-streamed lecture model as their guide to what a web-based course should be.

While expensive in terms of the technology and time to digitize lectures and to load them onto the web, this approach to web-based courses was economical in terms of faculty time and effort. Faculty continued to do what they usually did – lecture – and the technical types behind the scenes took care of the rest. What resulted was an assembly line and mass-production approach to web-based courses. In essence, the new web-based course production model became grounded inadvertently in the industrial model of mass production distance learning from the early twentieth century rather than embracing the more consumer-satisfaction oriented models of the late twentieth century. Otto Peters (1993), who analyzed distance education as a product of the industrialization era, concludes that in a postindustrial society the traditional industrial model of distance teaching will "no longer satisfy the new needs of new types of students with their particular expectations and values. . ." (p.57). He suggests that the situation calls for the design of new models of distance learning.

The impetus behind the continuing movement into web-format offering of distance learning courses appears to be more market oriented and motivated than driven by the traditional desire to increase educational access for individuals not able to come to

campus. As publicly funded institutions have experienced reduced levels of state funding and both public and private institutions have felt the market pressure from students to cap tuition increases, administrators have looked for new sources of students and revenue generation. As a result, administrators tend to look to web-based courses and degree programs as ways to increase access, but more importantly, as ways to tap into new markets of nontraditional students. They see increasing student numbers and dollar signs while they publicly tout increasing access to students.

The influx of for-profit organizations into the web-based educational market bolstered administrators' confidence in their commitment of dollars and effort to the development of web-based programs. The popularity of everything to do with the Web in the late nineties including the proliferation of ".com" online businesses added to their confidence levels. The financial markets' enthusiasm for web ventures further fueled the conviction that web-based learning ventures would provide lucrative revenue opportunities. The National Technological University (NTU), SUNY, Cornell and others formed for-profit businesses, some with an infusion of venture capital. As the reality has set in that establishing and maintaining web-based programs are resource intensive in comparison to the numbers of students registering for the courses and programs, these partnerships and business ventures are dissolving and disappearing.

It is primarily well-capitalized for-profits, such as the University of Phoenix (UofP) with its average of 17,000 students enrolled in web courses, that are capitalizing in a major way on the new web-based learning market. UofP uses a very structured approach to web course development that is not compatible with the faculty controlled

course development pattern institutionalized at most public and private higher education institutions. Teams of instructional designers, content experts and educational technology professions develop web-based courses. Working professionals are hired and trained as instructors to "teach"/facilitate the web course. While this model significantly reduces the instructor's input into the course content, it does give administrators assurance about the standardization of these courses. Active-based and collaborative web-based learning activities are incorporated into the courses as expected pedagogy.

Faculty who are venturing into the online teaching foray, in many cases, have little insight into how their pedagogical approaches may need to change or be changed in the process. Most of the rhetoric and activity are focused on the technology itself rather than on the learning experience facilitated by the technology. Yet, having the latest version of software, such as WebCT or Blackboard, to design web-based course formats is only one step toward designing appropriate activities and assignments to stimulate students' motivation to proceed and succeed in the course. Course development software provides a user-friendly computer framework in which to establish online course activities, such as synchronous discussions called "chats" or asynchronous discussions through which the ideas follow a common idea or "thread". But the instructor must reconceptualize how he/she delivers course content in the new Web environment. The effective "delivery" becomes more of a facilitation of online course activities rather than an informative talk before a live audience of students.

In 1988, a group of educators led by Raymond Nickerson came together to form the "2020 Panel" to create a vision of what technology in education might be thirty years

into the future. In their summary of the panel's work, Nickerson and Zodhistes (1988) identified a key question for the immediate future and beyond of "how to couple computer-based tools with other teaching/learning resources so as to support an integrated approach to specific matter in the classroom" (p.315). They closed the book with their projection that ". . .if technology is to be used to maximum advantage in the classroom in the future, it will be necessary for technology and pedagogy to advance together" (p.315).

While Nickerson and Zodhistes' prediction focused on the in-class use of technology, their point about the linked advancement of technology and pedagogy is just as pertinent or even more so for today's web-based courses. Plater (1995) asserted that technology was a transforming factor and as such was a "paradigm shift in the offing" (p.24). He coined the term "hyperlearning" to describe an environment where teachers draw readily upon sophisticated and user-friendly software programs to reformulate the ways they teach to empower students and to give them wide latitude in designing their own learning. Plater posited that hyperlearning opened the door to a "vast array" of potential ways for teachers and students to interact with each other in the teaching/learning process.

Davis (1995) also predicted that teaching would become more creative and learner-centered as the result of availability of new technologies and the increased application of what is known about learning. The question remains whether teaching and learning in a web-based environment have stimulated more active-based, learner-centered

approaches or merely transferred the lecture-based format of the traditional classroom into a web format.

Powers and Guan (2000) expressed their discouragement about the expectation that faculty would make web-based instruction interactive when research shows that the majority of courses rated the highest by on-campus students are predominately non-interactive lecture-based courses with student discussion accounting for only 2% of course activity. SUNY Buffalo's recent announcement of their intent to phase out their online MBA program stated that the reasons for the decision were based both on the level of resource commitment needed to develop and maintain a full cadre of web-based courses as well as the faculty's reluctance to invest time and effort into such development. (Mangan, 2002)

The actual motivation to enter the web course market or expand an institution's web course presence probably comes more from institutional administrators seeking to generate new sources of revenue from web courses than from faculty's desire to develop innovative ways to teach their courses in a technologically rich computer-based environment. Without incentives from administrators most faculty are apt to remain reticent and reluctant to invest the time and effort necessary to expand their pedagogical approaches into the Web environment.

Literature Reviewed

In preparation for the study several areas of literature were reviewed to provide a grounding and context for the study. One of those areas pertinent to this study was that

of student evaluations of teaching. A review of literature on the development of student evaluations of faculty provided a historical context for issues related to evaluating the effectiveness of web-based learning.

In the seventies when student evaluation systems were first developed, most instruction was lecture-based and students were more homogeneous than they are today. (Aleamoni, 1987) Theall and Franklin (2000) note that web-based learning situations are very different from those used to establish the psychometric properties of ratings data for traditional student rating systems. For that reason it is important to update student evaluation approaches on a regular basis to insure that the data collected are valid and reliable in the variety of educational contexts of today. (Centra, 1975; Doyle, 1975)

A review of available literature on student satisfaction and success in traditional distance learning courses provided the opportunity to identify important elements of satisfaction and success that should be included in the survey for this study. However, few empirical studies actually exist that investigate student satisfaction. Biner, Barone, Welsh and Dean (1997) noted the trend away from studies of student attitudes as effective outcome measures. They state that student attitudes are important to gage the effectiveness of distance education programs and courses. When information about student attitudes is gathered, the opportunity exists to identify problems related to student satisfaction and to make appropriate adjustments to maintain high levels of student satisfaction.

While student attitudes toward satisfaction have been of dwindling interest to researchers, measuring success is of growing importance in distance education. (Keegan,

1996) In most cases, success is defined as completion of a course or program of study. (Picciano, 2001) In their review of the literature on distance learners, Hansen and associates (1997) identified that key indicators of student success included higher levels of achieved education, higher grade point averages and successful completion of one or more distance learning courses. Although there are numerous studies on persistence in distance learning courses, little research has yet been done in web-based contexts. In one such study, Lim (2001) found a link between student satisfaction and comfort levels with computers and success in web-based courses.

Active-based and constructivist learning theories have gained popularity in recent years in the context of both the traditional classroom and the distance learning course. Active-based and constructivist learning activities have the potential to draw students separated by distance from their instructor and fellow students into a closer, more engaging and collaborative learning community. Awareness of the important aspects of these types of activities helped me to identify similar practices used in the web courses so that survey items could be developed to test for their presence and potential effect on student satisfaction and success.

Theoretical Framework

Two primary theoretical constructs frame the study. One of these pertains to students' sense of personal efficacy and interpersonal control. The degree to which students think that they are in control of their personal accomplishments, the more likely they will successfully complete their education. (Altmann and Arambasich, 1982; Rotter,

1989) This sense of control is a function of independence, competence and support. (Baynton 1992) The interrelationship of these functions can affect students' perceptions of their web-based experience.

Students' perceptions of their ability and skill, their opportunity to make choices within the parameters of course requirements, and the support they receive from instructors and technical support staff are all factors related to their sense of control and personal efficacy. Relating student's perceptions of their self-efficacy and interpersonal control to the types of flexibility and controls built into a web-based class can provide insight into why students may or may not find web-based learning to be a satisfactory and success approach to learning.

The second theoretical construct pertinent to this study is the theory of transactional distance. (Moore and Kearsley, 1996) Web-based learning, by its nature, takes place in an environment where distance separates instructor from students and the students from each other. Moore and Kearsley theorize that this distance is a pedagogical phenomenon and use the term transactional to emphasize the pedagogical rather than geographic connection. As such, it can be bridged by the type of instructional activities (structure) and level of interaction (dialog) designed into the course.

The interactions that take place within a distance course are all key to bridging the transactional distance. For the purposes of this web-based course study, three types of interactions are important: those between the learner and instructor, among and between learners, and between the learner and the web interface. (Moore, 1989; Hillman, Willis and Gunawardena, 1994) The flow of communication and the interplay that occurs

within and between each of these contexts affect the overall effectiveness of the instruction. The degree to which each of these levels of interaction successfully takes place ultimately affects students' perceptions of success and satisfaction.

Methods

The study focused on three higher education institutions and used a web-based survey instrument to collect data pertinent to the research questions. A cross-sectional survey collected data about students' perceptions about satisfaction and success in the two months following completion of their spring 2001 courses. Feedback from non-completers was solicited through the use of a modified and shortened version of the survey used with completing students. Study sites were three public Doctoral/Research Universities – Extensive with one located in the Southwest, one in the Midwest and one in the Northeast.

Two hundred sixty-nine (269) students enrolled in the spring semester of 2001 in 40 graduate-level, web-based courses at the three sites were surveyed using a web-based instrument. Students were divided into two study groups: completers and non-completers. A separate survey instrument was developed for each study group. The completer survey was extensive and required approximately twenty minutes to complete. The non-completer survey was concise and designed to be completed quickly in an effort to increase the chances that non-completers would take the time to complete it. The survey for course completers covered five major topic areas: experience with computers and the Web, course participation, images of self, perceptions of satisfaction and success,

and general information. The survey for non-completers covered two topic areas: general information and factors affecting decision to drop from the course.

Program administrators at each of the sites sent introductory emails to the students from their site, which included the URL for the appropriate survey. Respondents clicked on the URL and were taken directly to the website for the survey. Responses were stored in a text-based file that was later converted to an SPSS database for analysis. The participants were given two months in which to respond to their survey. If they responded within the two-month time frame, they were also given the opportunity to participate in a drawing for a gift certificate to an online bookstore. Program administrators sent out follow up emails to the students two weeks before the end of the survey period requesting that non-responding students take the time to respond. These reminders stimulated additional responses from non-completers but did not increase the number of responses from completing students.

Purpose and Significance

The purpose of this study was to investigate student satisfaction levels with their web-based learning experience. As web-based courses become more prevalent, the need grows for thorough, empirical research to determine the impact of various pedagogical approaches used in the web-based instructional environment on learning, persistence and student satisfaction. As numerous higher education institutions make concerted moves into web-based education, there is also a distinct need for empirical data about how well web-based learning is working for the students who take the classes.

The realities of the students' experiences with web-based learning will determine the extent to which they continue their education or the upgrading of their professional skill levels through this medium. The degree to which the panacea of new students and revenues materializes depends heavily on how well courses are designed, delivered and technically supported. The effects on increasing access are related to and affected by what types of students fare best and most value web-based courses.

Pressure is growing in the educational marketplace and internally within institutions to develop web-based courses or to expand the breadth of their online course offerings. The significance of this study lies in the fact that decisions are made daily by higher education administrators and decision-makers as a result of pressures to move forward with investments of time and monies to enter into or increase their positions within the web-based education market. Yet these administrators and decision-makers have little empirical data about what factors actually relate to student satisfaction and success in online learning.

The goal of this study was to provide reliable data about students' perceptions of their web-based learning experiences that can inform decision making about investments in and the organization of web-based program development at higher education institutions. The study was based on two working assumptions. The first was that web-based learning is a viable delivery method for education, particularly at the graduate level. Hiltz (1994) defines viable delivery as "a means of delivery that will result in acceptable levels of satisfaction and performance for instructors and students" (p.71).

The second assumption was that web-based methodology as a course delivery mode will involve and necessitate changes in the organization and support of teaching and learning.

Many of the current approaches to web-based learning have been stimulated the administrative pressure to introduce web courses quickly in an effort to capitalize on perceived revenue potential to the institutions. These early entries may not create the most effective learning environments for students. Research efforts, such as this study, to identify factors that significantly affect students' perceptions of satisfaction and success in web-based courses will provide much needed data about what the changes in organization and support of teaching and learning have been thus far or need to be in future generations of web-based courses. Robson (2000) notes that it is through evaluation of web-based learning that we are able to pinpoint interfaces that need to be developed, new ways for the current interfaces to be used, and new ways of teaching and learning that can be supported by emerging technologies.

LITERATURE REVIEW

The depth and range of research in distance learning are limited. In 1999 Phipps and Merisotis reported on their review of forty original research studies in distance learning done during the 1990's. They posit that there is a "relative paucity of true, original research dedicated to explaining or predicting phenomena related to distance learning"(p.2). They state that the most significant problem with current literature is that the overall quality of the original research is questionable, rendering the results inconclusive. Theall and Franklin (2000) note that given the current body of "lackluster" research comparing online and traditional instruction, it is difficult to "point to definitive findings that could guide the evaluation of online learning" (p.102).

My own review of twenty studies from the 1990's pertaining to evaluation and assessment of distance learning concurs with their findings. One of the common complaints about distance learning research in general is that most studies are not grounded in theory or in a conceptual framework. (Phipps & Merisotis, 1999) The studies that I reviewed were evenly split on inclusion of a theoretical or conceptual framework to guide the research. Theories used included locus of control and metacognition theory, interactionist and systems contingency theory, Moore's interaction framework, Moore's transactional distance theory, Tinto's theory of persistence, Salience theory, and social cognitive theory. Four studies used Moore's interaction framework. (Kelsey, 2000; Navarro & Shoemaker, 2000; Sherry, Fulford & Zhang, 1998; Vrasidas & McIsaac, 1999)

As distance learning is a composite of many aspects of traditional learning environments applied to new or modified teaching and learning contexts, the study of any specific facet of distance learning usually requires the review of a variety of literatures. Such is the case with the study of student perceptions of web-based distance learning. To lay the groundwork for my study, I reviewed literature related to student evaluations of faculty, student satisfaction and success, and active-based and constructivist learning theory as well as the theoretical constructs of interpersonal control and self-efficacy, student motivation and transactional distance. My rationale for selecting these areas of the literature for the focus of my review is briefly outlined below.

Student evaluations of faculty laid the initial groundwork for assessing learning in the classroom and provided an important context for issues related to evaluating effectiveness of web-based distance learning. As a result of investigating the factors that contribute to student satisfaction and success in the traditional distance classroom, I was able to identify pertinent elements of satisfaction and success that should be questioned in the survey developed for this study and to tie those factors to student motivation for taking the web-based course.

By developing an understanding of active-based and constructivist learning theory in the traditional classroom, I was able to identify similar practices in the web environment and to test student perceptions about the relationship of those activities to their satisfaction and success in their web-based course. My review of interpersonal control and self-efficacy theory gave me a lens through which to observe characteristics of web-based distance learners that might correlate with their satisfaction and success.

Distance between faculty and student is inherent in the web-based learning environment. My review of the concept of transactional distance provided me a lens through which to observe how instructors attempt to bridge that distance through the use of web-based course activities and to question how those activities relate to student success and satisfaction with their web-based course experience.

Background and Context

Much research has been done in the area of teaching in higher education. Menges (2000) categorizes the research into four significant areas: faculty as teachers, students as learners, content taught and learned, and environments in which teaching and learning occur including the method of instruction. Menges notes that, while there has been much research, there are areas where the research is substantial but not very useful to the practitioner. He includes instruction mediated by technology and effective evaluative decisions about how information gathered from student evaluation of courses and instructors is used among the areas where more useful research is needed. He questions whether students who have grown up in the information age are different postsecondary learners than their predecessors. He states that much new research is necessary to understand what are the distinctive differences between student-faculty instructional interactions in live settings and those that occur through technologically mediated environments.

Thorpe (1988) defines evaluation in a programmatic context as the "collection, analysis and interpretation of information about any aspect of a program of

education. . .as part of a recognized process of judging its effectiveness, efficiency and any other outcomes it may have" (p.5). According to Thorpe, evaluation is not synonymous with assessment, which she defines as the procedure of assigning value to learning achieved during a course. She notes that there are many purposes for evaluation and that different approaches are used based on the purpose of the evaluation. Among these purposes are judging the effectiveness of materials and courses, determining program costs, comparing different approaches to course delivery, "mapping" learner and instructor perceptions, and exploring factors that seem to affect program outcomes.

One of the primary modes of evaluation used in higher education today is that of student evaluations of instruction. Student evaluation systems were first developed in the seventies when most instruction was lecture-based and students were more homogeneous than they are today. (Aleamoni, 1987) As a result, there is a continuing need to update and revalidate approaches to student ratings to insure that data collected are valid and reliable in today's changing educational contexts. (Centra, 1975; Doyle, 1975) Theall and Franklin (2000) identify seven contextual changes in higher education, of which three are pertinent to my study:

1. Changing instructional practices, such as online, problem-based and collaborative learning,
2. Changing student populations including non-traditional and online students, and
3. Changing technology and data requirements in on-line instruction and evaluation (p.96).

The rapid growth of distance education, particularly asynchronous and online teaching, is a major new issue in evaluation. They note that distance and asynchronous learning situations are markedly different from those used to establish the psychometric properties

of ratings data of traditional student rating systems. Yet many online programs just adopt the instruments and process used in traditional courses. They suggest that student ratings collected using those instruments do not provide data that are sufficiently specific to allow for accurate understanding of the outcomes of instruction.

Hazari and Schnorr (1999) quote Reid's 1997 assessment that methods of evaluating the teaching and learning experience in online education are in high demand but short supply. They note that no measurement yet exists that would evaluate adequately how well a faculty member performs in a virtual classroom. Theall and Franklin (2000) note that "what is known about college teaching and learning comes from populations of younger, residential students in traditional classrooms and often from entry-level, large enrollment courses" (p.102). They suggest that, while the extrapolation of results from the traditional teaching and learning context to online teaching and learning is not totally unwarranted, the research needs to be replicated in the new situations before there is any assurance that the findings hold true. Theall and Franklin's opinion about the lackluster nature of distance learning research is based on their review of Russell's (1999) meta analysis of literature comparing traditional and distance learning and the high frequency finding of no significant difference between student success rates in the two settings. They are of the opinion that "it would be difficult at this time to point to definitive findings that could guide the evaluation of online teaching" (p. 102).

Chambers (1995) emphasizes the importance of course evaluation in the distance environment because the separation of the instructor and student may result in a mismatch of their respective expectations about the course. In most distance settings,

including online courses, the end-of-course student ratings serve as the sole source of summative evaluations. (Eastmond 1994) Regardless of the recognition that the contexts and situations for online learning are different from face-to-face instruction, Theall and Franklin (2000) suggest that many online programs simply adapt the evaluation process and instruments used in traditional courses to the online courses. "Student ratings collected with these instruments do not address the unique characteristics of the online teaching-learning situation and thus do not provide data specific enough to allow accurate understanding of the outcomes of instruction" (p.102).

Cheung (1998) states that student evaluations of distance learning courses are useful for such purposes as:

- Providing diagnostic feedback for improving the academic quality of the course,
- Allowing students the opportunity to express their needs and views formally and systematically,
- Advancing the research on distance teaching and learning, and
- Monitoring the quality of distance teaching for the sake of accountability (pp.23-24).

He notes that teaching effectiveness is a multidimensional construct. For example, students in an online environment may have excellent learning materials embedded in the course website yet lack the technical or instructional support to access the materials effectively. Cheung suggests that any instruments developed to evaluate distance education courses should start with a theory-based model with clearly defined dimensions. "Failure to do so may result in inadequate information for diagnostic feedback and misinterpretation of student ratings" (p. 24).

Evaluation of distance courses is an attempt to obtain a "good grasp" of how they function, how effective they are, and how they are received by students. (Holmberg, 1989, p.184) One of the aspects of judging the effectiveness of any distance teaching/learning system is determining the quality of the learning achieved. (Keegan, 1990) Students' perceptions can be one important way to judge the quality aspect of distance-based courses, including those online. Collecting students' perceptions is important because teaching effectiveness is judged in part upon how well student needs are met. Effectiveness is also judged based on the degree to which students actually interact with course content and the degree to which they learn the concepts and information presented. (Chambers, 1995; Cheung, 1998; Eastmond, 1994) Robson (2000) states that it is through evaluation of online learning that we are able to pinpoint interfaces that need to be developed, new ways for the current interfaces to be used, and new ways of teaching and learning that can be supported by emerging technologies.

While there is an expressed need to evaluate web-based learning, I found few empirical studies in my review of the literature. In the Vrasidas and McIsaac (1999) study, the sample consisted of only seven participants. While the study identified four major factors (course structure, class size, instructor feedback to students and participants' prior experience with computer mediate communication) influencing interaction in an online course, the sample was too small to generalize the findings beyond the original population of the study.

Computer Skills and Self-efficacy

Koroghlanian and Brinkerhoff (2000-01) surveyed mostly on-campus undergraduates taking online courses to test for computer skills related to Internet course delivery, attitudes toward Internet delivered courses, and prior Internet delivered course experience. The authors found that computer skills among the students were "shallow" and that students were neutral to slightly positive toward Internet delivered courses. They also found that students were neutral to slightly negative toward statements regarding course interactivity and choosing to take another online course.

Lim (2001) investigated computer self-efficacy, academic self-concept and other predictors of satisfaction and intent to participate in future web-based courses. She found a significant relationship between computer self-efficacy, which she defined as one's belief in personal ability to use computers and to learn new computer skills, and satisfaction. Years of computer use, Internet experience in a class and academic self-concept related positively ($p < .001$) to satisfaction. Fifteen percent of the variability in satisfaction was explained by the computer self-efficacy variables. Based on the results of the study, Lim concluded that students with higher computer self-efficacy scores were more likely to be satisfied with their web-based courses and more likely to take a future web-based course. In this regard, I expected to find in my study that students with high degrees of computer self-efficacy and positive attitudes toward computers and the Web would express higher levels of satisfaction with their web-based course experience.

Satisfaction, Success and Attrition

There are few studies that assess student satisfaction with distance learning. (Abel and Creswell 1983; Barker 1987; Barron, 1987; Harrison et al. 1991; Lienau 1987) Biner, Barone, Welsh and Dean (1997) observed, based on their review of the literature, that published distance education research that focused on student attitudes as an effective outcome measure had dwindled over the several previous decades. They suggest that this progressive abandonment of attitudinal research is the result of the general findings of early researchers that distance students were relatively satisfied with their distance learning experiences. Russell (1999) confirms the existence of this perception with his findings from his meta-analysis of pre-1999 studies. The majority of research studies he reviewed compared distance learning to traditional classroom experiences. In most cases, distance students did at least as well as their in-class counterparts based on grade comparisons leading to Russell's exposition of the no significant difference phenomenon in his book of the same title.

Biner, Barone, Welsh and Dean (1997) argue that there is a need to reverse this research trend away from student attitudes as an effectiveness outcome measure and that student attitudes *"per se* represent an important criterion by which to gauge the effectiveness of [distance education]" (p.318). They go further to suggest that it would be in the best interests of all distance education programs to establish systematic ongoing attitudinal assessment plans to allow program personnel to "pinpoint satisfaction-related deficiencies quickly, make appropriate inventions, and subsequently maintain high levels of student satisfaction" (p.319).

Navarrro and Shoemaker (2000) theorize that high distance learner satisfaction should result in lower dropout rates. They think that satisfied distance learners are less apt to drop classes for nonacademic reasons while dissatisfied distance learners are more likely to drop due to low motivation. While they did not study the relationship between student satisfaction and dropout rate, they did investigate factors such as the relationship between student satisfaction and performance, student satisfaction with instructor, and how various types of interactions and technical problems affected student satisfaction. Their study compared the performance and perception of 49 "cyberlearners" to those of 151 traditional learners in a macroeconomics course in the fall quarter of 1998 at the University of California. The traditional learners were involved in three hours of lecture and one hour of discussion per week while the cyberlearners viewed a CD-ROM of the lectures and participated in asynchronous threaded bulletin board discussions. The cyberlearners had access to an online discussion room for synchronous discussions and had twenty-four hour email access to the instructor. Navarro and Shoemaker found that the cyberlearners performed as well or better than the traditional learners regardless of gender, ethnicity, academic background, computer skills and academic aptitude with a high degree of satisfaction. They also found that students' performance appeared to improve as their perception of course quality improved.

In their research of student satisfaction with various aspects of interactive telecourses, Biner and colleagues (1997) identified seven distinct factors of student

satisfaction: instructor/instruction, technological aspects of the course, course management, at site personnel, promptness of material delivery, support services and out-of-class communication with the instructor. In their study of 288 undergraduate students taking 17 live telecourses, they found that high levels of student performance were positively correlated with the technological aspects of the course ($p < .05$), the promptness of the material (homework and exams) exchange with the professor ($p < .05$), and overall satisfaction ($p < .01$). With the exception of site personnel, all of the factors of student satisfaction are also pertinent to the study of student perceptions of web-based learning. If the site personnel factor is redefined to equate to technological support personnel, this factor can be returned to the list of pertinent elements of student satisfaction with web-based learning. Based on this research, I expected to find that students who experienced regular feedback and communication from their instructors and who received timely technical support would be more satisfied with their web-based course experience.

Adult learners tend to be more responsible and more motivated than their younger counterparts. They also have other characteristics that are likely to influence their expectations of their instructors and their satisfaction with the course. (Theall and Franklin, 2000) According to the literature, distance learning students are typically older, married, have children, and very often balancing school responsibilities with their work and home duties. Two-thirds are female. Most of the students involved in taking distance education courses are adults between the ages of 25 and 50. (Souder, 1993; Moore & Kearsley, 1996; Picciano, 2001) According to the National Center for

Educational Statistics (Lewis, 1999) 90% of distance education programs are directed toward adults in undergraduate, graduate and continuing education programs. The future success of online learning may rest heavily on gathering feedback from this adult population about their satisfaction with their learning experiences. Given that the focus of most distance learning programs is directed toward adult students, they can determine the fate of entire online programs through their educational delivery choices. Whether students complete web-based courses or programs depends on many factors and is a valid concern for program planners and course developers.

Keegan (1996) notes that measuring success especially of adult learners is a "preoccupation" in distance education. While many researchers have done studies on persistence of adults in distance learning, very little information is yet available specific to web-based learning. (Kim, 2001) Picciano (2001) defines success in a web-based context as students completing a course or program of study.

Student attrition in a distance learning course can run as high as 50%. (Moore and Kearsley, 1996) In their review of the literature on distance learner attributes, Hansen and associates (1997) find that there is little difference among dropouts based on gender. They also find that attrition occurs more frequently for students over age twenty-five. Key indicators of student success in distance learning environments include higher levels of achieved education, higher grade point averages, and successful completion of one or more distance learning courses. Successful distance students also tend to be abstract learners who are self-directed with an internal locus of control and who are persistent in

pursuing their goals. Other determinants of success include such motivational factors as having higher education or career goals. (Picciano, 2001)

Student satisfaction can be one contributing factor to success in a web-based course. Kim (2001) finds a significant relationship between computer self-efficacy and satisfaction. She defines computer self-efficacy as "one's belief in ability to use computers and to learn new computer skills" (p.43). Joo, Bong and Choi (2000) expand the definition to include confidence in using computer technologies in general and in searching through electronic information sources such as the World Wide Web.

Computer self-efficacy is also one of the major factors in determining success in web-based instruction. (Hill and Hannafin, 1997; Joo, Bong and Choi, 2000) Students with higher computer self-efficacy skills are more likely to be satisfied with their web-based distance courses and are also more apt to take future web-based courses. (Lim, 2001) Lim cautions that as web-based learning opportunities become more prevalent, understanding and preparation of adult learners are crucial for success of both educational institutions and the learners.

Corporate University Xchange, an education and research consulting firm, recently completed a survey of working adult learners who had taken web-based courses through their companies or external providers such as universities. The number one reason students gave for dropping out was lack of time. Many also found trying to complete courses at their desktops difficult because of frequent distractions from coworkers. (Frankola, 2001) Changes in educational or career goals, finances, and family

obligations also contribute to student attrition in web-base courses and to decisions to forego future web-based learning opportunities. (Picciano, 2001)

Students' decisions to persist to completion of a course or to drop out result from any number of situations or circumstances that can and do occur during the course. In an effort to clearly identify and codify circumstances affecting persistence, Tinto (1975) developed a theory of student persistence and integration in traditional higher education courses. The foundation of Tinto's model is the student's social and academic contact and interaction with the institution. Other factors that contribute to course completion include student goals, student commitments and pre-entry attributes such as skills previously attained, prior schooling and family background.

More recently, Tinto applied this model to computer-mediated communication and collaboration in courses and classroom communities. (Tinto, 1997) In a study that compared student learning and persistence in a collaborative learning setting with learning and persistence in a traditional lecture-based setting, Tinto found that participation in collaborative or shared learning groups fosters development of a support network that ties students to the "broader social communities of the college while also engaging them more fully in the academic life of the institution" (p. 613). He also found that sharing curriculum through collaborative pedagogy where students and faculty share the teaching responsibilities brought added "intellectual richness" to the student experience that was not available in traditional pedagogical approaches.

Kennedy and Powell's studies of student withdrawal behavior in British Open University courses in 1976 resulted in the development of a descriptive model that

identifies two primary categories of student variables: student-centered, which are subject to little or no change, and circumstance-centered, which are subject to rapid variation. Student-centered factors include motivation, educational background, educational self-concept, personality, aptitude and stage of adult development. Circumstance centered factors include occupation, health, finances, family relationships, peer relationships, and institutional support. Changes in circumstance-centered factors were more likely to affect student persistence negatively than the more stable student-centered factors.

Osborn (2001) suggests that there are three general areas that are core to understanding student decisions and behavior in completing a web-based course: entry characteristics, social integration and academic integration. According to Osborn's study, entry characteristics, such as GPA and educational level, are important contributors to the prediction equation of whether or not students complete web-base courses. She found that at-risk students took more credit hours and worked fewer hours per week than did their more successful counterparts. Most had not previously taken distance learning courses prior to participation in the study. At-risk students were less likely to participate in optional course activities, such as student chat rooms, designed to stimulate social integration into the web-based learning environment because of time constraints and the circumstance-centered factors identified by Kennedy and Powell. Compared to completing students, at-risk students had less stable study environments, lower motivation and less computer confidence (self-efficacy). Such factors contribute to the level of academic integration that students can achieve in a web-based learning

environment. She concludes that social integration and academic integration factors are significant aspects of the relationships and experiences of distance learners. Awareness of the importance of such factors assist instructors in building courses that best foster social and academic integration in a web-based learning environment. Heightened awareness of these factors may also stimulate instructors to learn more about their student population and to develop a profile of the students' confidence levels, experience, motivation and study environment. Such awareness may help to identify potential at-risk students early in the course.

Ultimately, how higher education institutions and distance learning programs choose to address the myriad of factors that affect student satisfaction, success and potential attrition in web-based courses will determine the strength and viability of these programs as learning options for those who cannot return to campus to pursue their higher education goals.

Constructivist and Active-Based Learning

Teaching and learning in a web environment call for different and/or expanded instructional approaches from those used in a traditional classroom. (Powers and Guan, 2000) Yet many web-based courses today are no more than electronic correspondence courses where students read lecture notes online or view web-streamed lectures, complete written assignments and take exams. In such courses there is little interactivity between the instructor and student and little recognition that the instructor and the student both bring prior knowledge to the learning experience. "Most web-based

instruction today is based on behaviorism, viewing the learner as an empty vessel waiting to be filled" (Morphew, 2000, p.13).

Constructivist psychology views learning as a process of internal construction of meaning in long term memory that builds and reshapes personal knowledge through experience and interaction with the world. (Jonassen, 1994) The constructivist approach acknowledges that the instructor and the student bring prior knowledge to the learning experience. Over time the student "co-constructs" new meaning through active-based and collaborative learning activities with those who share his/her learning environment. (Morphew, 2000) Collaborative learning occurs when students and instructors create knowledge through a continuously evolving process. (Matthews, 1996)

Froh and Hawkes (1996) suggest that student learning is developed through a context of personal involvement. Involvement is directly linked to the concept of active-based learning. Bonwell and Eison as quoted by Froh and Hawkes define involvement as "anything that involves students in doing things and thinking about what they are doing" (p.125). An active-based online learning environment built to meet learner needs includes activities that explore and stimulate learners' motivation, foster and encourage participation and interaction among students and contains a considerable amount of personal and humanist or "perceived caring elements". (Powers and Guan, 2000, p.205)

Active-based and constructivist approaches use pedagogical goals in the knowledge construction process to provide appreciation of multiple perspectives, embed learning into relevant contexts and appropriate social experiences, and to encourage self

awareness of the knowledge construction process. Students are responsible for developing their own learning and transferable skills. Teachers serve as facilitators, coaches and guides rather than as sources of knowledge that require discussion between teachers and students. Authentic learning activities are anchored in real world problems and characterized by cooperative learning. (Hazari and Schnorr, 1999; Bostoch, 1997))

According to Powers and Guan (2000), the power of web-based instruction (WBI) in a constructivist environment is that students have varying degrees of control over when and where they gain their new knowledge. They also suggest that developing a web course that fosters student interaction and meets student expectations requires a better understanding of students from the cognitive, psychological and social perspectives. One way instructors can develop that breadth of understanding is to construct a student-centered needs assessment as the core of the instructional design process to guide decisions, set priorities and allocate resources to course design.

Active-based learning is the product of creative teaching that comes from careful planning. The challenge in constructivist design of a web-based course lies in finding the balance between interaction and personalization and between synchronous and asynchronous learning. When addressing the question of whether constructivist design factors should be included in web-based instruction, Powers and Guan (2000) report the findings of one study of 200 undergraduates where students taking the course online scored an average of 15% higher than those who took the traditional classroom-based version of the course regardless of their gender, ethnicity, academic background, computers skills or academic aptitude. They note that online courses only work well if

they are designed well and are more than digitized textbooks. Based on the existing literature about active-based learning, I expected to find in my study that students who participated in collaborative learning activities within would express higher levels of overall satisfaction with their web-based course experience than students who did not have active-based learning activities included as a part of their course.

Theoretical Framework

A theoretical construct pertinent to this study is that of independence and locus of control. Studies by Altmann and Arambasich (1982) and Rotter (1989) conclude that students who believe that their accomplishments are the result of their own internal sense of control are more likely to complete their education successfully. Students who attribute their success to luck or fate have an external locus of control and are more likely to become dropouts. Baynton (1992) sees control as a function of independence, competence and support. The student's opportunity to make choices, his/her ability and skill, and the support from individuals and the medium affect the student's sense of control.

According to Clark (1983) students who are anxious gain a great deal from added structure and support, while students who are more independent tend to gain more from a discovery approach. Clark suggests that motivation is influenced more by beliefs and expectations and is therefore attributable to individual differences in beliefs about media rather than by the type of media. A stable predictor of motivation over time appears to be student beliefs about their own ability and the demands of different instructional tasks.

(Salomon, 1984) Clark (1994) suggests that students' perceptions and beliefs about the media-based learning tasks and their own self-efficacy as learners should be evaluated.

The theory of transactional distance developed by Michael Moore in the late eighties postulates that distance is a pedagogical phenomenon. What is of importance to theorists and practitioners is the effect of distance on instruction, the learners, the instructors, the forms of communication and interaction, the curriculum and the management of the program. (Moore & Kearsley, 1996) Transactional distance exists between the instructor and the student in face-to-face learning situations as well as distance learning situations and affects the understandings and perceptions. The transactional distance is exacerbated by the geographical distance in distance learning and must be overcome by instructors and learners for effective, deliberate and planned learning to take place. Moore posits that the approaches to overcome this distance are instructional design and interaction procedures.

Moore and Kearsley see distance education as an interplay between people who are teachers and learners, in environments characterized by separateness and a subsequent set of special teaching and learning behaviors. The physical distance creates a communications gap or psychological space where there are potential misunderstandings between the behaviors of instructors and those of the learners. They use the term "transactional" to emphasize that this distance between instructor and learner is pedagogical and not geographic. They suggest that special teaching behaviors are essential to bridge the gap of transactional distance and classify these behaviors into two clusters: dialog and structure. The capabilities of the communications media used to

deliver the course affects the level of dialog that can occur within the course as well as the course structure. An example of using media to bridge transactional distance is the use of asynchronous discussions and live chat structures in an online course to incorporate a higher and more immediate level of dialog than could occur in a text-based correspondence course.

According to Moore and Kearsley, the greater the transactional distance, the greater the level of responsibility the learner must exercise to insure his/her learning. They posit that the more highly autonomous the learners, the greater transactional distance or the less dialog and less structure they can tolerate and be successful in a distance course.

Another theoretical construct closely related to dialog and applicable to distance learning is that of interaction. According to Moore (1989), there are three types of interaction that are pertinent to distance education: learner-instructor, learner-content, and learner-learner. Learner-instructor interaction provides motivation, feedback, and dialog between the teacher and student. Learner-content is the process through which students garner intellectual information from the material. Learner-learner interaction is the exchange of information, ideas, and dialog that takes place between students about the course. This exchange can occur in both structured and unstructured ways. Hillman, Willis and Gunawardena (1994) add the learner-interface. They warn that if a learner cannot interact successfully with the technology, he/she will be unable to engage actively in the education transaction. They note that the learner-interface interaction is a critical component of the distance equation that, for the most part, has been missing from the

literature. The flow of communication and the interplay that occur in each of these contexts affect the overall effectiveness of the instruction and ultimately the student's satisfaction.

While the types of interaction that exist in distance learning situations are important to students' satisfaction and ultimate success, how these interactions take place and the degree to which there is interplay between them is also important. Milheim (1995-96) emphasizes the importance of interactivity as an instructional activity. Interaction stimulates student motivation and promotes more effective learning as it enables students to learn more quickly, retain knowledge longer, and transfer and apply knowledge more easily in real life situations.

The social context of a course also affects motivation and attitudes as well as teaching and learning. Short, Williams and Christie (1976) theorize that "social presence" is a critical factor in a communication medium. They define social presence as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships . . ." (p.65). They suggest that social presence is inherent in the medium itself. In essence social presence is the degree to which "a person is perceived as a 'real person' in mediated communication. (Gunawardena and Zittle, 1997) The ability of the medium, materials and services to assist students in feeling "socially present" and in perceiving their fellow students as "real" within the course environment can make the difference in whether students persist to completion of the course. The challenge for course designers is to build in sufficient social interaction to assist students in feeling socially present within the electronic environment. Social

constructs such as immediacy and intimacy also have the potential to impact student satisfaction and success.

No matter how socially present and real that students perceive themselves and their fellow students to be in the web-based course environment, there are differences in background and experiences among students. In their review of the distance literature, Merisotis and Phipps (1999) assert that the body of existing research does not take into account such differences among students. The wide variance of achievement and attitudes within the groups suggests that learners have a variety of different characteristics. They suggest that the key factors influencing these differences could include gender, age, educational experience and learning styles. I would add depth of experience using computers, the Internet and the World Wide Web to the list. Such depth or lack of experience could be related to social class and ethnicity. How and whether instructors choose to address these key factors through course activities can make a difference in how effectively the web-based learning community established through the course supports and stimulates learning, satisfaction and success of the individual members of the community.

RESEARCH DESIGN AND METHODS

The purpose of this chapter is to describe the research design and study population and to discuss the data collection and management methods used for the study. In addition to a discussion of the research design, study population and the data collection and management processes, the chapter contains a list of the research questions developed from the literature review, a description of study variables, and a description of measures taken to inform respondents of their rights as study participants.

Research Design

Singleton and Straits (1999) identify three broad purposes for research: to explore a phenomenon to gain insight and understanding, to describe a particular group or situation as precisely as possible, or to examine and formally test relationships among variables. Exploratory studies delve into topics or areas where relatively little is known about some phenomenon often because of its newness. The descriptive study seeks to describe a situation or set of circumstances and is basically a "fact-finding" endeavor that is more structured than the exploratory study. The explanatory study tests relationships and seek answers to problems and hypotheses. Explanatory studies go beyond seeking information about isolated variables to describing relationships among variables. (pp. 90-91)

The purpose for this study is linked to all three of the purposes identified by Singleton and Straits (1999). At a basic level it seeks to explore the phenomenon of web-based distance learning as it relates to student perceptions of satisfaction and success and to gather related data to inform the literature. At the same time it seeks to identify relationships between satisfaction and success and a series of factors related to the design and conduct of web-based distance learning courses and to determine the degree or extent and direction of those relationships. As such, the study combined elements of the exploratory, descriptive and the explanatory study as part of the research design.

The situation stimulating this study is the current climate in which many higher education institutions are moving rapidly and concertedly into the development of web-based courses and degree programs with little empirical data or insight into the affect this approach to learning at a distance is having on the learners themselves as it relates to their satisfaction with and success in such endeavors. How students perceive their learning experience or lack of it through web facilitated delivery of educational opportunities will determine whether they see web-based instruction as a meaningful approach to continuing their learning activities. If they are not satisfied or not successful, chances are good that they will migrate to other educational approaches if they continue their education.

This study provides pertinent data for administrators and faculty contemplating entry into the web-based milieu as well as for those already into web-based delivery of courses and programs. Empirical data collected about student perceptions of satisfaction and success in web-based courses can inform the decision making process and program

and course development strategies for web-based programs. The more insight that administrators and faculty have about student perceptions of web-based learning, the more opportunity that the courses and programs they develop and offer will meet student expectations and keep them coming back to take more classes. The goal of this study was to gather reliable data and to provide insightful interpretation that can add to the distance learning literature about student satisfaction and success in web-based courses. This addition to the distance learning literature will provide the opportunity for more informed decision making by administrative policy makers, program developers, and instructors.

Development of the research design for the study consisted of formulating the research questions, identifying the population for the study, developing a web-based survey to collect appropriate data, collecting and managing the data, and analyzing and interpreting the data.

Research Questions

Research questions for the study were developed based on a review of literature about student evaluation of faculty, student satisfaction and success, and constructivist and active-based learning. The questions are grounded in the theoretical constructs of motivation, distance learning and evaluation.

(1) To what extent are students' conceptions about their self-efficacy related to their overall satisfaction with web-based learning?

(2) Is there a correlation between students' comfort levels with computers and the World Wide Web and their web-based course experience?

(3) To what degree are the level and rapidity of the communication flow between instructors and students related to students' satisfaction?

(4) Are available levels of technical support correlated with students' perceptions of satisfaction and success in web-based learning?

(5) Is there a correlation between students' participation in collaborative learning activities and their overall level of satisfaction with their web-based course experience?

(6) What motivates students to take online courses and are these factors positively correlated with persistence?

Study Variables

Dependent Variables

There were two dependent variables for the study: satisfaction and success. Overall success was determined by (a) completion of the course and (b) the grade earned in the course compared to grade by which students defined success. Satisfaction was a multi-dimensional concept grounded in participants' perceptions about the instructor, peer interaction, course activities, and technical support. Overall satisfaction was a composite variable of these perceptions.

Independent Variables

The independent variables were classified as they related to the characteristics of the technology, the individual students and the institutional contexts (sites) through which the courses were offered. They included participants' perceptions of self-efficacy and interpersonal control, attitudes toward computers and the Web, motivations for taking a web-based course, levels of communication and interactivity with instructors, and levels of technical support.

Self-efficacy and Interpersonal Control. Self-efficacy was defined as an individual's perceived control of personal achievement. Interpersonal control was defined as an individual's perceived control in interactions with others (Paulhus & Christie, 1981).

Motivation. Motivation for taking the course was defined as the reason or rationale for the student enrolling in the course.

Level of Communication with Instructor. Level of communication and interactivity with the instructor was defined as degree to which there was an exchange of information, signals or messages between the instructor and the distance student that was facilitated by web-supported vehicles such as email, frequently-asked-questions (FAQ's) links, chat rooms, and web-based discussions.

Level of Technical Support. Level of technical support was defined as the degree of availability of trained and knowledgeable technical support professionals or instructors to assist students in solving problems and challenges with computer programs and platforms and Web access.

Each of the independent variables was composed of a number of dimensions and operationalized through a series of questions on the survey. Rather than relying on one question to measure a variable, it was more valid to use several items with each measuring a slightly different aspect of the variable. The items were grouped into composite variables by the behavior, activity or attitude that they appeared to measure. (Refer to Appendix A for description of composite variables.) During the analysis process, these composite variables were analyzed to see if the items included were

sufficiently correlated according to Cronbach's alpha to be reliable variables. Demographic variables such as age or gender were used as control variables.

Population and Study Sites

This study investigated the perceptions of graduate students related to their experiences with web-based courses. The web-based course is the lowest common denominator of a web-based program. Many higher education institutions only offer a selection of web-based courses rather than full web-based degree programs. For this reason, the study focused on graduate students' perceptions of web-based courses rather than programs. Focusing on courses rather discipline specific degree programs allowed more potential for the generalizability of the study results.

Graduate web-based courses were selected for study because they are more likely to be stand-alone courses that do not require prerequisites or live lab components for successful completion. As institutions have moved more into the development of web-based courses, they have tended to focus, at least initially, more on the development of graduate level courses and programs. As a result, there are generally more graduate than undergraduate web-based courses available to distance learning students at an institution in any given semester.

Most of the students involved in taking distance education courses are adults between the ages of 25 and 50, married, have children and are very often balancing school responsibilities with their work and home duties. (Moore & Kearsley, 1996; Souder, 1993; Theall & Franklin, 2000). Web-based learning requires a high level of

discipline and self-motivation on the part of students. The graduate level audience by reason of age and incoming experience is a more mature audience. As such, members of this population are more likely to find that online learning works for them.

The study focused on three higher education institutions. To give a cross-sectional view by locale, one institution on the East Coast, one in the Midwest, and one in the Southwest were selected. All three sites are publicly funded Doctoral/Research Universities – Extensive by the Carnegie Millennium classification of higher education institutions (2002). Site A is located in a large southwestern city with a total of 42,000 day and evening students. It offers four master degree programs entirely through distance learning, which include the use of video, satellite, the Web or a combination of these technologies. Site B is located in a mid-sized northeastern city along the Atlantic seaboard and is the oldest of the land-grant institutions. It is also a sea, space and urban grant institution with a total of 20,949 students. Site B offers four master degree programs through distance learning by CD-ROM, videotape, the Web or a combination of these technologies. Site C is located in a small midwestern city, is the state's land-grant institution, has a student population of 36,738 and offers eight master degree programs online. The selection of the three sites was based on two qualifying criteria in addition to location: each institution must have offered a minimum of five web-based graduate courses during the spring 2001 semester and the program administrative staff must have been willing to facilitate access to the graduate students enrolled in their web-based courses.

While study sites were geographically disperse, it is important to note that distance students are not bound to institution and course selection by geography, as are on-campus students. The study sites selected provided an opportunity to learn whether or not graduate student perceptions about web-based learning varied by the size and location of the institution where they have chosen to register for graduate-level, web-based courses.

Protection of Human Subjects

Data collection and analysis were conducted under protection of human subjects' guidelines. Potential respondents were informed of the goals of the study and the procedures to protect the confidentiality of the data in the introductory email sent to them by the program administrator from their institution requesting their participation and containing the URL (uniform resource locator) for the study survey. Emails were sent by the program administrators at each site to assure protection of student privacy rights. The introduction to the survey also included an additional statement informing respondents that participation was voluntary and that their responses would be kept confidential. Response to the survey constituted informed consent in the study.

Data Collection Process

Site Selection and Sample. Based on my knowledge of the distance learning field and institutional activity in web-based learning, I selected five higher education institutions to invite to participate in the study. Two sites declined to participate. Site A

required that permission to survey students be obtained from each faculty member who taught a web-based course in spring 2001. An email was sent twice approximately two weeks apart immediately following the end of the spring semester from the program director introducing the possibility and purpose of the study to 33 faculty members who taught graduate level web-based courses. Eleven replied with permission to survey their students. Twenty-two instructors did not reply to the request.

Site B required that the study be submitted to their university's human studies committee for approval. A formal letter of approval and exemption from full Human Subjects Review Board review was received from the Acting Vice Provost for Research. Site C agreed to participate with no restrictions or qualifications to the study.

A pre-study data memorandum was sent to each of the three sites that delineated the pre-study data needed from the sites, the proposed model for dissemination of the URL for the study to the student sample, the rationale for the study and the study timeline. Each site was requested to provide a list of the number and names of the graduate web-based courses offered in the spring 2001 semester, the number of enrollments by gender, and the number of students dropping their course during the semester by gender.

The sample consisted of 269 students enrolled in the spring semester of 2001 in 40 graduate-level, web-based courses at the three sites. Nine courses were surveyed at site A. Fifteen courses at site B and 16 courses at C were surveyed. Table 1 shows the number of courses by site and field of study.

Table 1
Number of Courses Surveyed by Field of Study and Site (N = 40)

Field of Study	Site A n	Site B n	Site C n
Computer Science	0	0	6
Education	3	2	0
Engineering	3	7	10
Liberal Arts	1	0	0
Library Science	0	2	0
Nursing	0	4	0
Public Programs	2	0	0

The sample was stratified into two categories based on whether the students completed or dropped/withdrew from their courses. The 207 students who completed their courses were sent the URL for Survey A in the introductory email message they received from their site. Ninety-one (91) students or 44% responded to the survey. The 62 students who dropped or withdrew from their courses were sent the URL for Survey B. Fifteen (15) non-completing students or 24% responded to the survey. The

combined response rate for both surveys was 106 of 269 students responding or 39% of the total population.

Thirty-two (32) percent of the study population were female and 68% were male. The combined responses to surveys A and B closely reflected the gender composition of the sample with 28% females and 67% males replying. Five percent of the respondents did not identify themselves by gender.

Web Design of Survey Instruments. Two surveys were developed for the study: one for completers (Survey A) and one for non-completers (Survey B). Survey A covered five major topic areas: experience with computers and the Web, course participation, images of self, perceptions of satisfaction and success, and general information. Survey B covered two topic areas: general information and factors affecting decision to drop from the course. Each topic area was delved through a series of questions pertaining to the topic. Survey A was extensive and estimated to take twenty to twenty-five minutes to complete. Survey B could be completed within ten minutes. The rationale for the brevity of Survey B was that non-completers would probably be hesitant to complete the survey and were more likely to do so if the time required to complete the survey was short. (See Appendixes B and C for the complete surveys.)

FrontPage, a website and web survey software development tool, was used for the web design for both of the surveys. Once questions were developed, revised and selected for the inclusion in either or both the surveys, they were loaded into FrontPage and formatted based on the type of answer that was requested, i.e. check all that apply

responses, either/or choice responses, Likert scale responses or additional comment responses. Each potential response was coded with a label and string or numeric value.

A URL address was established for each survey on the Center for Computing and Information Technology (CCIT) server. Upon completion of the web design of both surveys, they were loaded onto the appropriate URL site on the CCIT server and revised for visual appeal and ease of reading.

Prior to granting exemption from review by the Institutional Review Board, the University of Arizona Human Subjects Protection Program director required that the web-based survey design was such that student responses could not be connected to their email addresses. To meet this requirement, the web design for the survey separated the actual survey instrument responses from the submission of the respondent's email address for participation in a raffle of a gift certificate to an online bookstore. This was accomplished by having the survey instrument reside on its own web page within the survey site. Upon submission of the survey respondents received a "thank you for participating" message from a separate web page that provided the respondents the opportunity to directly exit the survey site or to click on a button to bring up a page where they could submit their email address for participation in the raffle. The result was that the respondent's email address could not be connected to his/her survey responses.

The database requirements to handle responses to Survey A because of its length were too large for the capabilities of the database available through the FrontPage software. As a result, data collected from each survey were sent to separate text files for storage.

Student Contact Model. Emails in the form of a memorandum from the site program administrator were developed and customized for each site and population, i.e. completers and non-completers. The appropriate URL was inserted into the email based on whether it was being sent to completers (Survey A URL) or non-completers (Survey B URL). The URL was a hot link that took the student directly to the web site for the appropriate website where he/she could respond to the survey.

The program administrator at each site sent out the introductory emails between June 10th and 16th, 2001. Students who responded by August 15th had the opportunity to enter their email addresses in the raffle drawing for the gift certificate to the online bookstore. Follow up reminder emails containing the URL's were sent out by program administrators on August 1st to encourage additional responses. The follow-up email reminders generated the submission of most (73%) of the non-completer responses to Survey B but had little impact on the total number of responses from course completers (Survey A).

Data Management. Following the conclusion of the survey period on August 15, 2001, data stored in separate text files by survey were loaded into separate Excel spreadsheets. Prior to importing the data into Excel spreadsheets, they were reviewed to identify any situations that might cause problems once loaded into spreadsheets.

The review of the data in Survey B revealed a problem caused by the use of open-ended questions allowing respondents to enter their comments or responses in text boxes. If a respondent used the return key at the end of a line in the text box rather than

allowing the software to wrap the response within the space, the next line of text dropped to another line in the text file giving the impression of multiple respondents. TextPad, a data editing software tool, was used to remove the "enter" commands in the data within the text boxes so that the complete response was attributed to the actual respondent. Where it looked like there were 45 responses to the non-completer survey, there were actually only fifteen once the data were cleaned and appropriately attributed to the individual respondents.

Data from each spreadsheet were then imported into individual SPSS data files. String variables that would be used in subsequent analyses were recoded into numeric variables. Responses to negatively worded questions on Likert scales were reversed so that the scaling corresponded with positive responses for all questions within the topic area on the higher end of the scale and negative responses on the lower end of the scale. This was necessary to create composite variables. The new composite variables were tested for their level of reliability using the Cronbach's Alpha reliability scale computation in SPSS.

Frequency counts and summary statistics were run by site as the initial stage of analysis. Data were split by site for all analyses of Survey A data. Hierarchical regression was used to investigate research questions one and three. Correlation analysis was used to examine the direction of relationships in research questions two and four. Chi-square tests were used to investigate research questions five and six. Regression analyses were used with interval level data. Chi-square tests were used with ordinal data.

The maximum amount of appropriate data were included in each analysis. Where data were missing, they were dropped from that particular analysis.

Validity and Reliability Measures

The basis for the survey instrument used in this study was an instrument developed by Dr. Roxanne Hiltz and associates for use in evaluating the effectiveness of the Virtual Classroom™ in the late 1980's. The Virtual Classroom (VC) predated the use of the World Wide Web (Web) as the technological vehicle to deliver online courses. However, many of the questions asked by Hiltz are as pertinent today as they were in the days of closed computer system delivery of distance courses. With Dr. Hiltz's permission the original Virtual Classroom evaluation instruments were updated and combined into the web-based survey used for this study.

The items that Hiltz (1994) used to measure student subjective assessment of VC courses were developed based on a review of the teaching effectiveness literature, especially Centra's 1982 summary, and self-efficacy literature including Paulhus and Christie's scales for measuring personal self-efficacy and interpersonal control. She obtained permission to use items from these standard questionnaires and scales. Hiltz conceptualized effectiveness along four dimensions: "course content, characteristics of the teaching, course outcomes and comparisons of the process in the virtual and online formats" (p.154). Those items that related directly to the characteristics of the teaching and course outcomes were the ones pertinent to this study.

Items drawn from the Hiltz questionnaire were updated to reflect the use of the Web and new teaching/learning activities that are currently in use in many web-based courses. Where appropriate, questions were asked twice: once in the context of computer use and again in the context of the Web. One such example is the series of questions about current feelings about using computers that were asked again in the context of feelings about use of the Web.

New questions were added where needed to capture more clearly information about facets of web-based courses that did not exist in closed computer delivery systems that predated the Web. As this study focused on students perceptions of satisfaction and success with web-based learning, items were added to capture information about student motivation for taking the web-based course, student definition of success and student perceptions of satisfaction.

Construct or face validity is defined by Burns and Grove (1987) as "the degree to which a measurement strategy measures the construct it was designed to measure" (p. 296). To determine construct or face validity, the updated and expanded survey was reviewed by three distance learning professionals who were engaged in the development of web-based courses for delivery by their university. Based on their input a question was added asking about the ease with which students were able to download additional software applications needed for course activities to the Likert scale of questions about ease of accessing course materials and availability of technical support. The decision was also made to negatively phase one-quarter of the thirteen items in the Likert scale about course participation to address the potential of response bias from all items being

positively worded. We discussed the merits of rewording items in the scales of semantic differential items about attitudes about computers and about the Web but decided to leave them in their original forms as the scales were adapted from the Hiltz study.

Hiltz (1994) noted that it is more valid to use multiple questions than single items to measure slightly different aspects of a variable and then to combine them into scales or indexes. Scales of items were formed based on their face validity to measure a specific attitude or behavior that is considered part of a concept. Hiltz's expected time scale and computer attitudes scale were used in the revised instrument. The computer attitudes' scale was also revised to form a Web attitudes scale. Scales were also formed for a composite success measure, a composite satisfaction measure and a rate of response (rapidity) measure.

Cronbach's alpha was computed for each of the composite scales prior to their use in analyzing data to determine their overall reliability. Items were omitted that would have substantially lowered the Alpha value if they had been included in the composite. By omitting the "demanding/obliging" item in Hiltz's semantic differential item scale on computer attitudes, the Alpha increased from .80 on Hiltz's original scale to .83 for the revised computer scale and .81 for Web attitudes scale making the two new scales more internally consistent than the original scale.

Anecdotal Insight

Designing a web-based survey instrument required a considerable amount of time prior to the data collection and management process beyond the time required to develop

the actual survey questions. Each response had to be coded with a label and string or numeric value when the question and possible responses were entered into the FrontPage software. These labels and values translated into the columnar headings when the data were imported into SPSS. The advantage to using the web-survey beyond the ease of use by the respondents was that no manual entry of data into SPSS was necessary. The amount of time spent on the front end of the data collection process saved many times that amount in the preparation of the data for analyses.

DATA ANALYSIS AND STUDY RESULTS

This chapter presents sample characteristics and data analyses and results. Study results are presented in order of each research question and associated hypotheses.

Sample Characteristics

The composite responses by survey closely resembled the ratio of females to (32%) males (68%) in the sample. Twenty-nine (29) percent of the respondents to survey A of course completers were female. Sixty-seven (67) percent of the respondents were male with 4% of the respondents choosing not to identify themselves by gender. Twenty (20) percent of the respondents to survey B of non-completers were female. Seventy-three (73) percent of the respondents to survey B were male with 7% of the respondents not identifying themselves by gender.

In sites A and B, responding females who completed their courses outnumbered males who completed their courses. There were 63% females ($\underline{N}$ = 3) at site A and 74% females ($\underline{N}$ = 17) at site B. However, only 11% of the females ($\underline{N}$ = 7) at site C responded.

Comparing the responding population to the original study population revealed that of those completing students who chose not to respond to survey A, 26% were female and 74% were male. A similar comparison of non-completers revealed that 25% of the non-respondents to survey B were female and 75% were male.

The data from this study support previous research by Jacobs (1995) that women continue to cluster into feminized fields of study. Seventy-five (75) percent of

respondents enrolled in education courses and 90% of the respondents enrolled in library science courses were women. Eighty (80) percent of those enrolled in computer science and 91% of those enrolled in engineering courses were males. Table 2 shows a summary of the sample by gender and field of study.

Table 2
Sample by Gender and Field of Study (N = 100)

Field of Study	Total		Females		Males	
	n	P	n	P	n	P
Computer Science	30	30%	6	20%	24	80%
Education	6	6%	6	100%	0	--
Engineering	48	48%	4	8%	44	92%
Liberal Arts	1	100%	1	100%	0	--
Library Science	10	10%	9	90%	1	10%
Nursing	2	2%	2	100%	0	--
Public Programs	3	3%	2	67%	1	33%

Jacobs (1995) studied trends in the segregation of fields of study by gender by degrees earned from 1980 to 1990. He identifies three distinct reasons for gender segregation: uneven distribution across fields, crowding, and degree of intergroup contact. (p.84) Jacobs quotes recent studies that show that over half the women working would have to change occupations to be distributed in the same manner as men. He

suggests that the crowding of women into a small number of fields indicates how pervasive social restrictions are on women and comments that male dominated fields such as engineering remain male preserves. He concludes that the trend toward greater integration of women among college majors that prevailed from the sixties until the early eighties has all but halted. Jacobs suggests the changing structure may reflect a stabilization of gender roles into a new pattern.

Chi-square tests of independence revealed significant relationships between gender and field of study at both site B ($p < .001$) and C ($p < .001$). Table 3 shows the breakout of males and females by site and field of study.

Table 3
Course Completers by Field of Study, Gender and Site (N = 81)

Field of Study	Total		Site B		Site C	
	Female	Male	Female	Male	Female	Male
Computer Science	5	19	0	0	5	19
Education	6	0	6	0	0	0
Engineering	2	39	0	4	2	35
Library Science	9	1	9	1	0	0
Nursing	2	0	2	0	0	0

Respondents to surveys A and B were questioned about whether or not they were enrolled in degree programs. As shown in Table 4, fifty-nine (59) percent of the course

completers were enrolled in degree programs while only 13 % of the non-completers were seeking degrees. The fact that the majority of the course completers were enrolled in degree programs was not surprising given that each of the sites had four or more master level degree programs that could be completed through distance learning. A contributing factor may have been that the fields of study represented by the courses taken are for the most part professional fields of study. A motivation to move ahead within or to enter a new field of study may have provided the incentive to persist to completion. The need to stay current in one's professional field could also have stimulated desire to take Web-based courses. The distance learning studies in the literature to date do not directly address the enrollment status of study participants. There seems to be an assumption that all distance students are enrolled in degree seeking programs of study.

Analysis of those completing students who stated that they were not enrolled in a degree program revealed that 26% were females and 74% were males. Twenty-three (23) percent were enrolled computer science courses, 9% in education courses, 50% in engineering courses, 15% in library science courses and 3 % in nursing.

Respondents were asked to identify the name of the web-based course in which they were enrolled. Their responses to course name were coded and tallied by discipline to identify the distribution of students across disciplines. The 40 courses surveyed in the sample represented seven distinct fields of study. Seventy-three (73) percent of the course completers and 86% of the non-completers were enrolled in Engineering and Computer Science courses. Education and Library Science represented 20% of the

Table 4
Frequencies by Course Completion Status (N = 106)

	Total Sample		Course Completers		Non-completers	
	n	P	n	P	n	P
Enrolled in degree program						
Yes	56	54%	54	59%	2	13%
No	47	46%	34	38%	13	87%
Gender						
Females	85	32%	27	29%	3	20%
Males	184	68%	60	67%	11	73%
Discipline of Courses Taken						
Computer Science	31	29%	25	28%	6	39%
Education	6	6%	6	9%	--	
Engineering	50	47%	43	45%	7	47%
Liberal Arts	2	2%	1	1%	1	7%
Library Science	10	10%	10	11%	--	
Nursing	3	3%	3	3%	--	
Public Programs	2	2%	2	2%	--	
Missing	2	2%	1	1%	1	7%
Web-based Courses Previously Taken						
0	55	52%	48	53%	7	47%
1	15	14%	13	14%	2	13%
2 or more	35	33%	29	32%	6	40%
Missing	1	1%	1	1%	--	
Total time spent on course per week						
Less than one hour			--			
1 – 2 hours			2	2%		
3 – 5 hours			13	14%		
6 – 9 hours			25	28%		
10 – 12 hours			26	29%		
13 or more hours			23	25%		
Missing			2	2%		

Note. Total time per week question was only on Survey A (completers).

course completers. The remaining survey respondents were enrolled in Nursing, Public Programs, or Liberal Arts.

The majority of course completers from site C (94%) were enrolled in computer science (39%) or engineering (55%) courses. The majority of students at site A and site B were enrolled in public programs, library science or education. Only one student out of four at site A and three students out of 23 at site B were enrolled in engineering courses. Neither site A nor B offered any computer science web-based courses in spring 2001.

To determine level of course-taking experience, students were asked to identify the number of web-based courses previously taken. For over half of the population of course completers (53%), the course they took in spring 2001 was their first experience taking a web-based course. However, 32% of the course completers had taken two or more web-based courses prior to enrolling in their spring 2001 web-based course. Forty-seven (47%) of students who dropped or withdrew from their course stated that it was their first experience with a web-based course.

Course completers were asked how many hours per week they spent on all online and off-line activities associated with their web-based course. Most students (81%) spent between six and thirteen hours on course preparation and participation with the frequency of students responding in each of the three categories roughly equivalent (6-9 hours = 28%, 10-12 hours = 29%, 13 or more hours = 25%).

Chi-square test of independence revealed that there was a significant relationship between site and gender ($p = < .001$) and between site and age ($p = < .05$) for survey A

respondents (completers). There were no significant relationships between site and either gender or age on Survey B respondents (non-completers). Based on the apparent difference between sites in terms of age and gender, sites were treated separately in subsequent analyses of program completers using Survey A data. While there was a significant relationship between site and gender and between site and age at site A, only four students responded to Survey A. Due to the small number of respondents, site A was not included in any further analyses of program completers using Survey A data.

A chi-square test of independence revealed a significant relationship between age and gender ($p = < .001$). Ninety-five (95) percent of males fell between the ages of 18 and 44 while only 74% of females were between 18 and 44. Twenty-six (26) percent of women completing courses were 45 and older. Only 5% of males were between the ages of 45 and 54. Chi-square tests between age and degree seeking status and between gender and degree seeking status revealed no significant relationships.

As shown in Table 5, thirty-five (35) percent of course completers at Site B fell into the 25-34 age range with 22% falling into the 45-54 range. By comparison, 62% of the course completers at site C fell into the 25-34 range while only 3% were in the 45-54 range. The percentages of course completers in the 18-24 age range and the 35-44 age range at Sites B and C were very close. Thirteen (13) percent of course completers at site B were between the ages of 18 and 24 while 16% of course completers at site C fell into the same age range. Seventeen (17) percent of course completers at site B were between the ages of 35 and 44 with 16% of course completers at site C falling into the same age range. The concentration of students in the 25-44 age range is not surprising

given that the disciplines of the courses are, for the most part, from professional fields of study. Between the ages of 25 and 44 young professionals tend to make concerted efforts to move forward in their career fields.

Table 5
Course Completers' Age by Site (N = 87)

	18-24		25-34		35-44		45-54		55 up		Missing	
	n	P	n	P	n	P	n	P	n	P	n	P
Site B	3	13%	8	35%	4	17%	5	22%	2	9%	1	4%
Site C	10	16%	40	62%	10	16%	2	3%	--		2	3%

The ratio of females to males responding to Survey A from site B was inverse to the ratio of females to males responding from site C as shown in Table 6. For site B the ratio of females to males responding is 17:5 while the proportion of females to males responding for site C was 7:55. These ratios are not surprising given that site B courses were from more highly feminized fields of study.

Table 6
Course Completers' Gender by Site (N = 87)

	Females		Males		Missing	
	n	P	n	P	n	P
Site B	17	74%	5	22%	1	4%
Site C	7	11%	55	86%	2	3%

Data Analysis

All data analyses were conducted by site using site B and site C to split out the data. Items that were stated negatively in Survey A were recoded positively to correspond with other positively stated items when used in composite variables.

Research Question 1: To what extent are students' conceptions about their self-efficacy related to their overall satisfaction with web-based learning?

$H1_a$: Students with high levels of personal efficacy will be more satisfied with their web-based course experience.

$H1_b$: Students with high levels of interpersonal control will be more satisfied with their web-based course experience

The self-efficacy scale consisted of two ten-item subscales: personal efficacy and interpersonal control. Reliability analysis of the ten items in the personal efficacy subscale revealed an Alpha of .77. The Alpha for the ten items on their interpersonal control subscale was .80. As these two subscales were used with permission, the decision was made to leave all ten items in each subscale and to collapse each subscale into a composite variable named for the items it represented: personal efficacy and interpersonal control. Each composite variable was an average of the items included in the scale.

Fourteen items questioned various aspects of students' satisfaction with their course experience. Reliability analysis was conducted on the group of fourteen items resulting in an overall Alpha of .89. All the items were closely correlated and were collapsed into a composite satisfaction variable using an average of the items. (See

Appendix A for a list of items forming each of the composite variables personal efficacy, interpersonal control, and composite satisfaction.)

Tables 7 and 8 show summaries by site of the hierarchical regression of overall satisfaction on personal efficacy and interpersonal control. The purpose of the analysis was to determine if students who reported higher levels of overall satisfaction also reported higher levels of personal efficacy when controlling for interpersonal control factors.

The results for site B showed that the regression was significant ($F = 4.43$, $p < .05$). The regression accounted for approximately 32% (.003 + .315) of the variance in students' overall satisfaction at site B. Perceptions of personal efficacy explained 31.5% of the variance in overall satisfaction when controlling for perceptions of interpersonal control. Interpersonal control accounted for less than 1% of the variance in overall satisfaction.

The regression for site C was also significant ($F = 7.85$, $p < .001$) and accounted for approximately 21% of the variance of students' overall satisfaction. Interpersonal control explained 12% of the variance in overall satisfaction. Personal efficacy explained an additional 8.4% of the variance when controlling for interpersonal control.

Comparing the results of the regressions by site showed that higher levels of personal efficacy appeared to predict higher levels of overall satisfaction at both sites. However, the amount of variance explained by personal efficacy at site B (31.5%) was more than three times that of site C (8.4%). Interpersonal control at site B accounted for less than one percent whereas it accounted for the majority of the variance at

Table 7
Summary of Site B Hierarchical Regression Analysis for Self-efficacy Variables Predicting Overall Satisfaction (N = 22)

Variable	B	SE B	β	R	p
Step 1					
Interpersonal Control	8.574	.334	.057	.003	.800
Step 2					
Interpersonal Control	-8.863	.290	-.059		
Personal Efficacy	1.320	.446	.573	.564	.008**

Note. $R^2 = .003$ for Step 1; $^{\Delta}R^2 = .315$ for Step 2.

** $p < .01$.

site C (12%). As the majority of respondents at site B were females (75%), it appears that a high level of personal self efficacy was an important characteristic of females who completed their web-based courses. Although the amount of variance explained by interpersonal control at site C was rather low, the significance of the characteristic could be associated with the fact that the majority of the students at site C were male (86%). These findings may speak to the gender roles that students bring to their course taking experience.

The results of the two regressions give support for $H1_a$ at both sites, especially at site B. The results of the regression for site C showed that higher levels of interpersonal control do significantly account for higher levels of students' overall satisfaction.

However, interpersonal control at site B did not significantly account for variance in overall satisfaction. These findings support $H1_b$ at site C but not at site B.

Table 8
Summary of Site C Hierarchical Regression Analysis for Self-efficacy Variables Predicting Overall Satisfaction (N = 64)

Variable	B	SE B	β	R	p
Step 1					
Interpersonal Control	.339	.117	.347	.347	.005**
Step 2					
Interpersonal Control	.119	.141	.122		
Personal Efficacy	.328	.129	.367	.452	.014*

Note. $R^2 = .120$ for Step 1; $^{\Delta} R^2 = .084$ for Step 2.
* $p < .05$.
** $p < .01$.

Research Question 2: Is there a correlation between students' comfort levels with computers and the World Wide Web and their web-based course experience?

$H2_a$: Students with positive attitudes toward computers and the Web will be more successful in their web-based learning experience

$H2_b$: Students with positive attitudes toward computers and the Web will be more satisfied with their web-based learning experience.

Student comfort level was operationalized as the student's attitudes toward using the computer and the Web. After eliminating the "demanding/obliging" item from both the computer attitude scale and the Web attitude scale, reliability analysis of the nine

items in each scale revealed Alpha's of .83 and .81 respectively. Each scale was collapsed into a composite subscale using the average of the items in the scale. The new composite variables were named for the items they represented: feelings/computers and feelings/Web.

Success was operationalized as the grade students earned in their web-based course. Overall satisfaction was operationalized using the composite satisfaction variable formed by using the averages of the fourteen items related to satisfaction with course experience.

Table 9 shows the results of the tests for correlation between student comfort levels with computers and the Web and their web-based course experience. Analysis of the data for site B shows that students' attitudes/feelings about computers are positively correlated with their attitudes/feelings about the Web ($r = .835$, $p < .01$). Their attitudes/feelings about computers explained 69.7% ($.835^2$) of the variance in their attitudes/feelings toward the Web. The more comfortable the respondents were with using computers, the higher their comfort levels appeared to be about engaging in activities on the Web. While there was a high correlation between respondents' feelings/attitudes for computers and the Web, the extent of their feelings about computers did not translate into significant levels of correlation between satisfaction and feelings about computers or between success and their attitudes about computers

Site B student's attitudes/feelings about the Web were also positively correlated to both their overall satisfaction with their course ($r = .423$, $p < .05$) and their success in the course ($r = .443$, $p < .05$). Students' attitudes/feelings about the Web

explained 17.8% ($.423^2$) of the variance in their overall satisfaction with their web-based course experience and 19.6% ($.443^2$) of the variance in their success in their course.

Analysis of the data for site C showed that students' attitudes/feelings about computers were positively correlated with their attitudes/feelings about the Web ($\underline{r} = .751$, $\underline{p} < .01$). Their attitudes/feelings about computers explained 56.4% ($.751^2$) of the variance in their attitudes/feelings toward the Web. Student's attitudes/feelings about the Web were positively correlated to their overall satisfaction with their course ($\underline{r} = .335$, $\underline{p} < .01$). Their attitudes/feelings about computers were also positively correlated to their overall satisfaction ($\underline{r} = .311$, $\underline{p} < .05$). Students' attitudes/feelings toward computers and the Web accounted for 20.9% ($.335^2 + .311^2$) of the total variance in overall satisfaction. There was also a significant correlation between students' success in their course and their overall satisfaction ($\underline{r} = .407$, $\underline{p} < .01$) explaining 17% ($.407^2$) of the variance.

The fact that the majority of course completers were male (86%) at site C and that 66 (94%) of all male course completers at either site were enrolled in computer science or engineering courses may explain the high level of correlation between site C students attitudes toward computers and the Web. Both computer science and engineering as professional fields are heavily reliant upon the use of both computers and the Web for projects and activities related to accomplishing work. Individuals choose computer science and engineering fields in part because of their preference to work in computer based environments. It would follow that this characteristic of the field might

help explain the positive correlation found between satisfaction and attitudes toward computers and the Web.

Table 9
Correlation between Student Feelings With Computers and the World Wide Web and their Web-based Course Experience (N = 86)

Variable	Feelings Computers	Feelings Web	Satisfaction	Success
Feelings/Computers				
Site B	1	---	---	---
Site C		.751*	.311*	.006
Feelings/Web				
Site B	.835**	1	---	---
Site C	---	---	.335**	-.081
Satisfaction				
Site B	.363	.423*	1	---
Site C	---	---	---	.407**
Success				
Site B	.186	.443*	.326	1
Site C	---	---	---	---

* $p < .05$
** $p < .01$

Based on the correlational analyses for sites B and C there is support for $H2_a$ that students with positive attitudes/feelings about the Web will be successful in their web course. There is no evidence of a significant relationship between students' success and their attitudes about computers at either site.

At site B there is also support for $H2_b$ that students with positive attitudes/feelings toward the Web will be more satisfied with their web-based course experience. There is no support at site B that students with positive attitudes towards computers will be more satisfied. Results from site C support $H2_b$ that a positive correlation exists between students' attitudes/feelings about computers and the Web and their satisfaction.

Research Question 3: To what degree are the level and rapidity of the communication flow between instructors and students related to students' satisfaction?

H3: Students who receive feedback on a regular basis from their instructor will be more satisfied with their web-based course experience.

Level of communication was operationalized as the number of communication options supported by course software and degree to which students found these options useful in facilitating the course communication flow. The reliability analysis for the nine items in the communication level composite variable gave an Alpha of .78. Rapidity of the communication flow was operationalized as the turnaround time of instructors' responses to direct student queries by email and by the timeliness of the turnaround email responses and of graded assignments. Reliability analysis of the three items in the rapidity composite variable resulted in an Alpha of .81.

Tables 10 and 11 show summaries by site of the hierarchical regression of overall satisfaction on level of communication and rapidity of communication. The purpose was to determine if students who reported higher levels of overall satisfaction also reported more rapid communication flow when controlling for the level of communication factors.

The results for site B showed that the regressions are significant ($F = 8.197$, $p < .01$). The communication flow model accounted for 45% (35.4% + 9.6%) of the variance in students' overall satisfaction at site B. The rapidity of the communication flow accounted for approximately 10% of the variance when controlling for the level of communication. Student perceptions of the level of communication explained 35.4% of the variance in overall satisfaction.

Table 10
Summary of Site B Hierarchical Regression Analysis for Communication Flow Variables Predicting Overall Satisfaction ($N = 23$)

Variable	B	SE B	β	R	p
Step 1					
Level of Communication	.471	.139	.595	.595	.003**
Step 2					
Level of Communication	.468	.131	.592		
Rapidity of Flow	.241	.129	.310	.671	.076

Note. $R^2 = .354$ for Step 1; $\Delta R^2 = .096$ for Step 2.
** $p < .01$.

Step one of the regression for site C was significant ($F = 5.06$, $p < .05$) but explained only 7.5% of the variance in students' overall satisfaction. Step two of the

regression model was non-significant with rapidity of communication flow accounting for less than 1% of the variance in satisfaction when controlling for the level of communication.

Table 11
Summary of Site C Hierarchical Regression Analysis for Communication Flow Variables Predicting Overall Satisfaction (N = 64)

Variable	B	SE B	β	R	p
Step 1					
Level of Communication	.166	.074	.275	.275	.028*
Step 2					
Level of Communication	.145	.086	.239		
Rapidity of Flow	3.421	.069	.070	.281	.623

Note. $R^2 = .075$ for Step 1; $\Delta R^2 = .004$ for Step 2.
** $p < .05$.

Comparing the results of the regressions by site showed that higher levels of communication flow appeared to predict higher levels of overall satisfaction at both sites. However, the amount of variance explained by the level of communication at site B (.354) was five times that of site C (.075). Rapidity of communication flow appeared to have little effect on student satisfaction at either site. It is not surprising to find the considerably higher degree of the relationship between satisfaction and level of communication at site B as the majority of course completers were female (74%).

Women tend to ask more questions and seek more advice than their male counterparts in any given situation, for example, the joke about women's willingness to stop and ask for directions when lost as compared to their male companion's choice to keep driving in circles rather than asking for directions.

Based on the results of the two regressions by site, there is support for H3 that students who receive feedback on a regular basis from their instructor will be more satisfied with their web-based course. At the same time there is no evidence to support that a positive correlation exists between students' overall satisfaction and the rapidity of the communication flow.

Research Question 4: Are available levels of technical support correlated with students' perceptions of satisfaction and success in web-based learning?

> $H4_a$: Students who have readily available technical support will be more satisfied with their web-based course experience.
>
> $H4_b$: Students who have readily available technical support will be more successful in their web-based course.

Levels of technical support were operationalized as the student's attitudes toward the level of support they received from the instructor, teaching assistants and the technical support line for their institution. Overall satisfaction was operationalized using the composite variable formed by using the averages of the fourteen items related to satisfaction with course experience.

Overall success was operationalized on a scale of one to three by creating a new variable that compared how students defined success in terms of a grade and the actual grade that they earned. If a student stated that he/she defined successful completion as

earning an A and did earn an A, then the new variable reflected that he/she was successful. If a student stated that his/her definition of successful completion was earning a B or better and he/she earned an A or a B, he/she was classified as successful. Likewise, if a student defined success as earning a C or better and earned a C, B, or A, he/she was successful. If, however, a student defined success as earning a B or better and earned a C in the course, then she/he was classified as unsuccessful by her/his own definition of successful completion.

Table 12 shows the results for tests for correlation between available technical support and students' experience with their web-based course experience. Analysis of the data for site B revealed that there were no positive correlations between available technical support and either students' overall satisfaction or success in their courses. Teaching assistants providing help when requested accounted for 18.1% ($.426^2$) of the variance in students' perceptions of technical support being available through the student help line whenever needed.

Analysis of the data for site C showed the availability of help from the instructor positively correlated with their overall success ($r = .334$, $p < .05$). Help from the teaching assistants also correlated positively with overall success ($r = .322$, $p < .05$). Their perceptions about the availability of help from the instructor explained 10% ($.316^2$) of the variance of their perceptions about the availability of help from teaching assistants. Help from teaching assistants explained 6.8% ($.322^2$) of the variance in students' perceptions of the availability of technical support. There was also a significant relationship between students' overall success in their course and their overall satisfaction.

Table 12
Correlation between Student Perceptions of Available Technical Support and their Web-based Course Experience (N = 87)

Variable	Instructor Help	Student Help Line	TA Help	Satisfaction	Success
Site B					
Instructor Help	1	-.306	.076	-.025	---[a]
Student Help Line	---	1	.426*	-.168	---[a]
TA Help	---	---	1	.094	---[a]
Satisfaction	---	---	---	1	---[a]
Success	---[a]	---[a]	---[a]	---[a]	---[a]
Site C					
Instructor Help	1	-.007	.316*	.208	.334*
Student Help Line	---	1	.260*	.010	.134
TA Help	---	---	1	.161	.322*
Satisfaction	---	---	---	1	.340*
Success	---	---	---	---	1

Note. [a] Mean of success = 1.0; statistic could not be computed.
* $p < .05$

It is interesting that at both sites students equate technical support from the student help line with the teaching assistants assigned to their course. The fact that the amount of variance explained at site B (18.1%) is three times that explained at

site C (6.8%) may also be attributed to gender characteristics. Females may be more willing to seek assistance on technology related issues from other students rather than from the professor or another source. This may also account for the lack of significance between instructor and availability of technical support at site B where females were the majority of the students (74%).

Based on the correlational analysis for site B, no support for $H4_a$ is evident that students who have readily available technical support will be more satisfied with their web-based course experience. There is also no evidence to support $H4_b$ that students who have readily available technical support will be more successful in their web-based course.

No support is found at site C for $H4_a$ that a significant relationship exists between available technical support and students' overall satisfaction. Positive relationships were found between availability of instructor assistance and overall success and between help from TA's and overall success. When limiting the definition of available technical support to instructor assistance or help from TA's, there is support for $H4_b$ that there is a significant relationship between available technical support and students' overall success in their course.

Research Question 5: Is there a correlation between students' participation in collaborative learning activities and their overall level of satisfaction with their web-based course experience?

> $H5_a$: Students who participate in collaborative online learning activities will be more satisfied with their web-based course experience.

$H5_b$: Students who participate in collaborative online learning activities will be more successful in their web-based course.

Participation was operationalized by the formation of a new variable that included collaborative activities that the students apparently used based on their responses to Likert scale items referring to their opinions about the use of such activities. The three collaborative activities were the use of chat room, web-based small group collaborative projects and bulletin board conference discussions. If students replied to any of the three items with a rating of more than zero (not applicable), they apparently participated in the online based activity. A participation variable was computed for each activity recoding any level of response to the original Likert scale above zero as one. An overall participation variable was computed by summing the number of technologies used giving a value between 0 and 3 for each respondent.

Success was operationalized by computing a new variable that ranked students' levels of success based on the degree to which they reached their level of expectations in terms of the grade that they earned. If the grade that they earned was higher than had expected, students were assigned a score of three for a ranking of "higher than expected". If they earned the grade that they had expected to earn, they were assigned a score of two for a ranking of "expected". If they earned a grade lower than they had expected, students were assigned a score of one for a "lower than expected" ranking. Satisfaction was operationalized using the composite satisfaction variable previously computed.

An ANOVA initially conducted on combined site data revealed no significant relationship between participation and satisfaction ($p = .089$). A chi-square test was then

conducted to test for a significant relationship by site between participation and satisfaction. The chi-square value was not significant for either site B ($\chi^2 = 7.44$, $p = .434$) or site C ($\chi^2 = 12.82$, $p = .118$). Satisfaction appeared not to be related to student's participation in collaborative online learning activities. As a result, there is no support for $H5_a$ that there is a correlation between students' participation and their satisfaction with their web-based learning experience.

A chi-square test was run to test for the significance of the relationship between students' participation in collaborative online learning activities and their level of success as ranked by the new level of success variable. The chi-square value was not significant for either site B ($\chi^2 = 3.8$, $p = .434$) or site C ($\chi^2 = 4.64$, $p = .591$). Success appeared to be unrelated to the students' participation in online collaborative learning activities. There is no support for $H5_b$ that there is a correlation between success and participation.

While disappointing that no significant relationships were found between students' participation in collaborative learning activities and satisfaction, it was not entirely surprising. Courses studied were not selected based on the type and number of collaborative learning activities included as a part of class requirements or activities. Based on student responses, most instructors did not require participation in those activities that were included. It was also evident from the responses that the number and type of collaborative activities included in any class was limited at best. A qualitative case study across sites might better address questions related to the type collaborative activities designed into class activities and the extent to which they are included in course design.

Research Question 6: What motivates students to take online course and are these factors positively correlated with persistence?

Motivation was operationalized as the students' goals for taking the course. Of the total respondents, 67% stated that earning a passing grade was their goal while the goal for 29% was to learn the course content. The remaining students stated that their goals were either to apply the knowledge gained in the course or to challenge oneself. Table 13 shows the frequency of responses by site for students' goals for taking their web-based course. Persistence was operationalized as success in the course as determined by students' grade in the course.

Table 13
Frequencies for Student Goals for Web-based Course (N = 86)

Variable	Apply Knowledge		Learn Content		Challenge Self		Passing Grade	
	n	P	n	P	n	P	n	P
Site B	---		3	13%	---		19	83%
Site C	2	3%	22	34%	1	2%	39	61%

Note. One student (4%) at site B did not respond.

According to the data, 70% of the respondents at site B defined success as earning an A. At site C 39% of the respondents stated that they equated earning an A with success in the course. Another 45% of the site C students defined success as earning a B or better. Only three students (5%) of the site C students and none of the site B students defined success as earning a C or better. Based on these results, the defined success

variable was recoded into two categories: "A" and "Not A" for the purposes of further analysis to determine the strength of the relationship between students' definition of success and the grade they earned in the course.

As shown in Table 14, only four students (6%) at site C earned a C. All other students at both sites earned either an A or B. The grade earned variable was also recoded into same two categories as the recoded defined success variable: "A" and "Not A". A chi-square test was then conducted to determine the relationship between student goals (motivation) and the grade that they earned (persistence).

Table 14
Frequencies for Students' Definition of Success and Grade Earned

Variable	A		B		C	
	n	P	n	P	n	P
Define Success [a]						
Site B	16	70%	5	22%	---	
Site C	25	39%	29	45%	3	5%
Grade Earned [b]						
Site B	20	87%	3	13%	---	
Site C	35	55%	23	36%	4	6%

Note. [a] B is defined as ≥B; C is defined as ≥C for define success variable. Site B (N = 23),
Site C (N = 57).
[b] Site B (N = 23), Site C (N = 64).

While the results of the chi-square test for site B were not significant (see Table 15), 71% or fifteen (1Not A/not A + 14 A/A) of the students received the grade they wanted for the course and 29% (2 A/Not A + 4 Not A/A divided by 21) of the students received grades other than the grade that they had set as their goal. Eighty percent of the students earned an A that had not expected to earn an A before the course started. There was a significant relationship between the grades students had as goals and the grades that they earned at site C ($p < .001$). Fisher's Exact test probability was also less than .001. Seventy-eight percent (22 Not A/Not A + 21 A/A divided by 55) of the students received the grade that they had expected with 84% (21/21+4) of those expecting an A earning A's and 73% (22/22+8) of those not expecting an A earning less than an A. Twenty-one percent students did not receive the grade that they had expected earning a grade either lower or higher than they had expected.

A majority of the students stated that earning a passing grade was their goal for taking the course, and a majority of students earned the grade that they had set as their goal or better. There appeared to be a positive correlation between motivation (goal for the course) and persistence (success in the course). Having the motivation to earn a particular grade seemed to generate the persistence to achieve that goal or better.

When asked how they paid for their web-based course, almost half (48.3%) of student completers from the combined sites stated that they were reimbursed by their employers. Another 5.5% received scholarships from academic sources or from their employer. It was not surprising then that grade would be the primary motivation or goal for these course completers. Over half of the students were required to achieve a

Table 15
Chi-square Test of Variance between Student Definitions of Success and Grade Earned (N = 76)

Variable	χ^2	df	Grade Earned: Not A	Grade Earned: A
Define Success				
Site B	.175	1		
Not A			1	4
A			2	14
Site C	17.983***	1		
Not A			22	8
A			4	21

*** $p < .001$

particular level of success as measured by their grade earned to qualify for employer reimbursement or to maintain their scholarship. Another factor that may have contributed to the positive correlation between grade as the motivation and goal for the course and persistence may be the fact that 54% of the course completers across sites were also enrolled in master degree programs. Most graduate colleges require a minimum B average for graduate students to remain in good standing within their program of study.

Summary of Tests of Hypotheses

Six of the nine hypotheses of the study were supported at either or both sites based on the results of the analyses. Table 16 delineates which hypotheses received support by site.

Table 16
Tests of Hypotheses

Hypothesis	Supported?
$H1_a$: Students with high levels of personal efficacy will be more satisfied with their web-based course experience.	Yes, both sites
$H1_b$: Students with high levels of interpersonal control will be more satisfied with their web-based course experience	Yes, site C
$H2_a$: Students with positive attitudes toward computers and the Web will be more successful in their web-based learning experience	Yes, both sites
$H2_b$: Students with positive attitudes toward computers and the Web will be more satisfied with their web-based learning experience.	Yes, both sites
H3: Students who receive feedback on a regular basis from their instructor will be more satisfied with their web-based course experience.	Yes, both sites
$H4_a$: Students who have readily available technical support will be more satisfied with their web-based course experience.	No, both sites
$H4_b$: Students who have readily available technical support will be more successful in their web-based course.	Yes, site C
$H5_a$: Students who participate in collaborative online learning activities will be more satisfied with their web-based course experience.	No, both sites
$H5_b$: Students who participate in collaborative online learning activities will be more successful in their web-based course.	No, both sites

DISCUSSION AND CONCLUSIONS

The purpose of this study was to identify factors that relate to student satisfaction and success in web-based distance learning courses. This chapter presents a summary of results pertaining to the Survey A course completers, a discussion of data gathered from non-completing students who responded to Survey B, and related recommendations for policy and future research.

This study tested the relationship of five categories of factors with student satisfaction and success: self-efficacy, comfort levels with computers and the Web, communication flow with instructors, levels of technical support, and participation in collaborative online learning activities. Based on the results of the study, student perceptions of satisfaction and success with their web-based course experience appear to be intertwined positively with various aspects of the course experience with all but one (participating in collaborative learning activities) of the five categories exhibiting varying degrees of significantly positive relationships with satisfaction and success.

The study also investigated the link between motivation and persistence. Motivation can be operationalized in various ways. As a result of the after-the-fact timing of the survey for course completers, this survey tested the conceptualization of course goal as an indicator of motivation. Based on the results there does appear to be a link between motivation when it is defined as goal for taking the course and persistence.

Completing Students

The profile of the completing students who responded to Survey A included a strong sense of interpersonal control and self-efficacy with 70% of site B and 90% of site C students agreeing to strongly agreeing to factors identified by Paulhus (1983) as indicators of high levels of personal efficacy and control. Over fifty percent (53%) of the students were between the ages of 25 and 34, and students were twice as likely to be male as than female. Fifty-nine percent of the completers were enrolled in degree programs. For 53% of the completing students this was their first experience taking a web-based course while 32% of the respondents had previously taken two or more web-based courses.

Satisfaction and Self-efficacy

Paulhus and Christie (1981) developed the Spheres of Control battery to assess individuals' perceived control in specific behavioral spheres. They define personal efficacy as the sphere of personal control where the individual seeks control in situations of personal achievement such as in passing a course. They label group situations where the individual interacts with others as the sphere of interpersonal control. Such situations include defending his/her interests in meetings and attempting to develop relationships with others. Paulhus and Christie state that the spheres of personal efficacy and interpersonal control are conceptually independent of each other. They suggest that the individual should be "characterized by a control profile, a pattern of expectancies that he brings into play in confronting the world" (p.167).

Using Paulhus and Christie's work as a basis, the study attempted to identify the relationship between web students' perceptions of perceived control and their satisfaction with their course experience. At site B 32% of students' satisfaction was attributed to their perceptions of personal efficacy ($p < .01$). At site C 12% of the students' satisfaction was explained by their perceptions of interpersonal control ($p < .01$) and another 8% of their satisfaction was explained by their perceptions of personal efficacy ($p < .05$).

The differences in results between the two sites may be attributable to either or both of two possibilities. Participants at site B were primarily female (75%) and enrolled in library science (44%) and education (26%) courses. Respondents from site C were predominantly male (86%) and enrolled in engineering (55%) and computer science (39%) courses. Either gender or discipline or a combination of both could have affected the degree of the relationship between personal efficacy and satisfaction and between interpersonal control and satisfaction. Understanding how the web students' perceptions of perceived control relate to their satisfaction can provide insight that can assist in development of satisfying courses that give students appropriate levels of comfort and control. Pursuing further research controlling for gender and discipline may reveal a more in depth understanding of the relationship between satisfaction and self-efficacy.

Comfort Levels with Computers and the World Wide Web

Hiltz (1994) recognizes that student comfort levels in using the computer are inextricably tied to their success in using a computer-based learning system such as the

Virtual Classroom™. As a result she and her associates developed the nine item semantic scale about feelings/attitudes about computers that was updated and replicated for use in determining feelings/attitudes about the Web for this study.

In the Web environment computer skill is an important factor in access and navigation and a source of anxiety for some adult students. Osborn (2001) finds that at-risk web-based students had less computer confidence than their completing student counterparts. Lim (2001) labels the concept of computer confidence as computer self-efficacy and defines it as the extent to which one believes in his/her computer capabilities and his/her ability to learn new computer skills. Lim identified a significant relationship between computer self-efficacy and satisfaction ($p < .001$) where computer self-efficacy explained 15% of the variability in satisfaction (p.46). Joo, Bong and Choi (2000) link computer self-efficacy with Internet self-efficacy as a determining factor for success in web-based instruction.

This study attempted to verify the link between computer and Web self-efficacy and student satisfaction and success in web-based courses. There was a strong correlation between student feelings about computers and their attitudes toward the Web with computer self-efficacy explaining 70% of the variance in students' feelings about the Web at site B ($r = .835$, $p > .05$) and 56% of the variance in students' feelings at site C ($r = .751$, $p > .01$). While positive, the correlation between student feelings about the Web and their satisfaction with their course at both sites was less strong. Feelings about the Web explained only 18% of the variance in students' satisfaction at site B

($r = .443$, $p > .05$). At site C feelings about the Web accounted for only 11% of the variance in student's satisfaction with their course ($r = .335$, $p > .01$). Their feelings about computers accounted for an additional 10% of the variability in satisfaction ($r = .311$, $p > .05$). Students at site C also positively related their satisfaction in their course to their success with their course ($r = .407$, $p > .05$).

The findings of this study support the findings of Lim's study. While the strength of the relationship that she found between computer self-efficacy and satisfaction was stronger with a higher level of probability than this study, she did not clearly identify the number of respondents to her survey. Her population consisted of 235 students taking web-based courses compared to an initial population for this study of 269 students. As she does not state the response rate that she received to her survey, it is difficult to compare the results of the two studies definitively. She did not test for the relationship of Web-efficacy to satisfaction or success as this study did.

Communication Flow and Satisfaction

Moore (1989) theorizes that learner-instructor interaction is an important component of distance learning. Such interaction provides motivation and feedback to students while stimulating dialog between the instructor and student. Navarro and Shoemaker (2000) found that 85% of cyberlearners who had access to asynchronous threaded discussions, online synchronous discussions and twenty-four hour email access to their instructor thought that they had adequate opportunities for learner-instructor interactions. Biner, Dean and Mellinger (1994) identify out-of-class communication with

the instructor as one of seven factors underlying student satisfaction with distance learning courses.

To investigate the link between student overall satisfaction and communication with the instructor, this study questioned completing students about the level of communication that occurred within their course and the rapidity with which the instructor responded to email queries and turned around graded assignments. The results showed that the rapidity of the communication flow had little effect on the satisfaction levels of students at either site B or C. How rapidly the instructor responded to email or phone inquiries and turned around graded homework and exams did not appear to affect overall student satisfaction with the course. Students were more concerned that the instructor did respond rather than how rapidly the response took place.

The level of communication was identified by the composite number of communication options available to students such as online discussions, threaded bulletin boards, chat room, email, posting of frequency asked questions (FAQ's). Results showed that higher levels of communication flow appeared to predict higher levels of student satisfaction at both sites. However, the degree of satisfaction explained at site B (35%) was almost five times that of site C (7.5%). This difference in satisfaction explained between the two sites may be attributable to the difference in the type of communication options available in the courses at each site. The courses at site C tended to be more web-stream lecture oriented with fewer communication options available. The difference might also be explained by the gender composition of each site with 75% of the respondents at site B being females and 86% of the respondents at site C being male.

Communication needs and patterns may have varied by gender and by function of the field of study.

Technical Support, Satisfaction and Success

Technology is the denominator for distance education in the web-based environment. While Moore and Kearsley (1996) theorize that the physical or transactional distance between the learner is pedagogical rather than geographic, the bottom line is that the gap between the learner and instructor cannot be bridged if the technology, for whatever reason, does not work properly or the student cannot figure out how to use it. Hillman, Willis and Gunawardena (1994) warn that a learner unable to interact successfully with the technology cannot actively engage in the education transaction.

This study questioned completing students about the sources of technical support available and the degree to which these sources were helpful or useful to the students. To determine the strength of the relationship between available technical support and satisfaction and between technical support and success, tests for correlations were run by site. No significant relationships between available technical support and either satisfaction or success were found at site B. There did appear to be a positive relationship between students' perceptions of technical support being available through the student help line and the availability of teaching assistants with 18% of the variance explained ($r = .426$, $p < .05$). It is possible that teaching assistants responded to students using the help line for certain courses and that they were closely identified with the assistance received through the help line as a result.

At site C there was a significant correlation between both available instructor help and success and between available help from teaching assistants and success, but the amount of variance explained was small in both cases, 11% ($r = .334$, $p < .05$) and 10% ($r = .332$, $p < .05$) respectively. While smaller than the level found at site B, a significant relationship also existed at site C between the availability of help from teaching assistants and assistance available through the student help line ($r = .226$, $p < .05$). This perception may have existed for the same reason previously mentioned that the TA's may have been responsible for responding to requests for assistance through the help line for a few of the courses at site C. Success in the course explained 12% of the variance in students' satisfaction with their course ($r = .340$, $p < .05$).

It is worth noting that 22% of the students at site B and 19% of the students at site C stated that they did not need any technical support. No significant relationship was found at either site B or C between available technical help and satisfaction. The fact that there were no significant relationships between technical support and satisfaction may be attributed to an expectation on the students' part that technical assistance must be available for web-based courses.

The correlations at site C between help from the instructor and success and between help from teaching assistants and success were significant but explained very little of the variance. A larger sample at both site B and C may have given more power and revealed higher levels of correlation between success and the types of technical help available. It is also possible that the survey questions pertaining to available technical

help could have been stated differently or more clearly to generate more significant results when used in correlation analyses.

Collaborative Learning Activities and Satisfaction

According to Froh and Hawkes (1996), collaborative learning actively involves students in building their learning and sense of community. Collaborative learning activities are one way to overcome the transactional distance described by Moore and Kearsley (1996) and for intentional learning to take place. "Collaborative learning recognizes that both academic and interpersonal involvement are essential to student learning" (Froh and Hawkes, p. 127). Powers and Guan (2000) state that successful learning takes place only when students are actively involved in the process. They quote the results of a study by Jiang in 1998 where there was a significant correlation between the amount of the instructor's participation and the level of student participation. Based on these findings, they suggest that student learning can be enhanced when an instructor intentionally designs student interactions into web-based courses.

To test the relationship between collaborative learning activities and student satisfaction and between collaborative learning and success, this study questioned completing students on their opinions about participating in collaborative online activities such as chat room, web-based small group activities and bulletin board threaded discussions. Chi-square tests were conducted for each site to test for the strength of the relationship of participation in collaborative learning activities with both satisfaction and success. No significant relationships were found at either site.

This study did not control for the specific type of learning activities used as a part of the course when identifying courses at each site for inclusion in the sample population. All graduate web-based courses in the spring of 2001 at each site were included in the study. The fact that the study did not reveal any significant relationships does not negate the potential of collaborative learning activities to enhance web-based learning, but it may call their importance into question. Based on the completing students' responses it appears that site B or C web-based courses either did not involve or did not emphasize the use of interactive pedagogical activities as a part of courses requirements.

This study does identify an opportunity for future research to explore the extent to which collaborative learning activities are used in web-based instruction and what form these activities are taking and to compare student perceptions of collaborative activities in courses using similar type activities. There is the possibility that such research may reveal that collaborative and active-based learning activities are not as important to web-based learning as they are presumed to be by pedagogic experts.

One way to approach future research on collaborative web-based learning would be to study courses within specific disciplines that encourage collaboration in traditional classrooms to determine how those pedagogical values and activities are translated into web-based courses within the discipline. Many business administration and education programs appear to value group learning activities in master level courses. Such programs as well as many others could be productive areas in which to focus future research efforts.

Motivation and Persistence

The more successful distance students tend to be self-motivated with the less motivated students contributing to the high drop out rate in distance education courses. (Moore & Kearsley, 1996; Porter, 1997; Powers & Guan, 2000; Theall & Franklin, 2000) The challenge becomes finding out what motivates students to take web-based courses and to stimulate that motivation through course-related activities. (Powers & Guan, 2000)

As this study occurred after students completed their spring 2000 courses, students' motivation was equated with their goals for taking the course. The majority of students at both sites stated that their goal for their course was to earn a passing grade. The goal of a passing grade may be partially attributable to fact that almost half (48%) of the students were reimbursed by their employer for course tuition if they earned the required passing grade.

A chi-square test to determine the relationship between motivation (student goals) and persistence (grade they earned) was not significant for site B while it was significant for site C ($p < .001$). Having the motivation to earn a particular grade seemed to generate the persistence to achieve that goal for students at site C. One explanation for why there was a significant relationship between motivation and persistence at site C but not site B could be the fact that most of the students at site C were taking engineering or computer science courses. Engineering and computer firms tend to offer tuition reimbursement plans for employees as a company benefit. Another explanation may be that the sample size (23) at site B was too small to reveal a significant relationship.

Powers and Guan (2000) suggest using an online survey prior to the beginning of a course to gather information about three factors that can help to identify students' motivation: intention to complete the course, early submission of work and completion of other distance courses. The data collected would assist the instructional designer to develop a learner analysis and remind or alert students to potential barriers they may encounter in taking a web-based course. While this is a sound and reasonable proposal, many instructors do not have the assistance of an instructional designer. The faculty member designs the course, puts it on the Web, perhaps with the help of a graduate student, and manages the course. Little extra time is available to develop and post an online survey. There is an opportunity for future researchers to develop and test such an instrument that could be disseminated to interested faculty and/or institutions for their use.

Non-completers

As Hiltz (1994) notes, students who drop distance courses tend to be elusive and hard to reach. I found the same pattern with my study. Only 15 (24%) of the 62 students who dropped their web-based courses during the spring of 2001 responded to Survey B for non-completing students. The majority of those responding were males (73%) and between the ages of 25 and 34 (67%). At the beginning of their course, 60% of these respondents expected to earn an A grade and 33% expected to earn a B.

Previous experience taking web-based courses did not seem to be a determining factor in whether students decided to drop their course. The sample was almost evenly

split between those who had previously taken no web-based courses (46%) and those who had taken two or more web-based courses (40%) prior to the one in which they were enrolled in spring 2001. The remaining 14% of the respondents had previously taken one web-based course. The fact that most of the respondents (87%) were not enrolled in degree seeking programs may have made the decision to drop their class an easier choice than continuing in spite of challenging circumstances or discontent with the course. In spite of their decisions to drop their course, 71% of the respondents stated that they would register for another web-based course given the opportunity to do so.

Non-completing students were given nineteen factors to rate in terms of importance to their decision to drop their course. The three factors that rated most often as "very important" were all unrelated to the course experience itself. Health or personal problems ranked as a very important factor for 27% of the respondents. Too many outside demands and change in job or level of responsibilities both ranked as a very important factor for 53% of the respondents.

Factors relating to the web-based course that rated as "somewhat important" in the decision making process were the difficulty of the course (33%) and the fact that the respondents missed being in a classroom with the instructor and classmates (33%). Items that were rated as "not important" by the majority of the respondents included: course was too much work, did not like the instructor, subject was boring or irrelevant, not doing well in the course, did not like web-based learning, course did not match expectations, trouble logging onto the course web site, took too long to download course materials,

instructor rarely answered my email questions, no one to help with technical problems and increase in work-related travel.

While the above items were rated as not important by the majority of the respondents, a number of the items were very important to segment of the population: did not feel a part of the class (20%), did not like web-based learning (13%), course did not meet expectations (13%), took too long to download course materials (13%), and no one to help with technical problems (13%). The fact that the instructor rarely answered student's emails was either somewhat important or very important to 20% of the respondents.

When asked what that they liked best about their web-based course experience, 11 out of the 15 replies (73%) pertained to the convenience and flexibility that taking a web-based course provided. What they liked least fell into three primary categories. They missed interaction with the instructor and other students (33%); they thought it took too long to get replies to their questions or concerns (20%); or they had slow Internet connections (20%) that caused frustrations with access and/or download times.

Nine students (60%) of the respondents made additional comments when given the opportunity to do so on the survey. Comments were varied and could not be coded by topic for that reason. One student commented on his/her excitement that a regular on-campus course was also offered as an web-based course only to realize the problems that resulted from course staff having to cater to needs of both the on-campus and off-campus students. Another student noted that he/she had registered for three

web-based courses, dropped one and completed the other two. One student was in the military and commented that he/she was subject to unexpected changes in his/her work shift. He/she also commented on the need for more flexibility for distance students when taking tests and the fact that a "multitude of technical problems detracted from my studies". One student dropped the course because he/she did not have the prerequisites to take the course and the prerequisite course was not offered. Another student commented on his/her desire to register well in advance of the course starting to have time to "review the books and the information because this is a new discipline for me".

A professional chemical engineer with "substantial software development experience" was looking to develop mastery in the subject and was looking for highly qualified instructors and did not feel he/she had found such a person in the instructor. Another student changed jobs and the demands as a new hire were too high to be able to complete the course. Yet another student found his/her course interesting and could apply the information but still dropped the course for unexplained reasons.

While the sample size of the non-completers was too small to generalize the results of Survey B beyond the scope of this study, it is interesting to note several points. The age range of the respondents corresponds with the age range (25-24) where Hansen et al. (1997) found attrition among distance learners more frequently occurring in the studies that they reviewed. This is the time in young professionals' lives where they are beginning their forward progression in their careers. It is also a time when they may be starting families. Both of these potential scenarios exert circumstance-centered pressures such as occupation-related, health, financial and family relationship factors

identified by Kennedy and Powell (1976) that were more likely to affect student persistence negatively. With non-completers rating outside demands and changes in job or level of responsibilities as very important factors in their decisions to drop, they fit the dropout sensitive profile identified by Kennedy and Powell.

The majority of the non-completers responding to Survey B were from site C where the prevalent form of web-based courses centered on web-streamed lectures. These courses more nearly replicated their on-campus, lecture-based counterparts where little collaborative or constructivist learning activities are used as a part of a course. One-third of the responding non-completers commented that they missed the interaction with the instructor and fellow students. Tinto suggests (1997) that collaborative or shared learning groups stimulate the development of a support network that draws students more closely together, engages them more fully in academic life and creates a sense of belonging or social presence. This absence of activities to create feelings of being socially presence (Short, Williams & Christie, 1976) and to encourage in engagement in shared learning activities may have contributed to the students' lack of motivation to continue in their courses and their ultimate decision to drop.

While the courses with web-streamed lectures were not satisfying to these students in regards to engagement with the instructor and fellow students, this form of web-based course is prevalent among many university offerings. The University of Illinois and Stanford received million-dollar grants from the Sloan Foundation to digitize lectures to create a cadre of engineering and computer science courses for web delivery. The grant-funded streaming activities belied a mindset that doing what was normally

done in the classroom (lecturing) was appropriate and sufficient for web-based courses delivery.

Non-completers versus Completers

The dropout rate for the study population (23%) as a whole was considerably lower than the 30% to 50% dropout rate that was found in many of the studies reviewed by Moore and Kearsley (1996). Twenty-four percent of the students from the original study population who did drop their courses responded to the survey for non-completing students but that number only translated into a total of 15 respondents for Survey B.

While the non-completing student sample was too small to generalize beyond the borders of this study, the demographics of the sample corresponded to the demographics of their completing student counterparts. The three factors that non-completing students identified as the most important reasons affecting their decisions to drop the class (health or personal problems, outside demands, and changes in job or level of responsibilities) fit the circumstance-centered pressures that Kennedy and Powell (1976) state are characteristic of the dropout sensitive student.

The questionnaire for Survey B was intentionally kept short to stimulate non-completing students into investing a small amount of time to reply. Even with the shorter survey, few non-completing students replied. If the sample size for the non-completer study had been larger and the survey more in depth, reliable analyses could have been conducted to develop a clearer profile of the non-completing students and their perceptions about web-based distance learning.

Conclusions and Implications

This study was an exploratory study to investigate the relationships between student perceptions of satisfaction and success and those aspects or components that generally comprise web-based distance learning courses. While it was not an attempt to look at education gained, the economics of doing web-based courses or the quality of such courses, the study did offer the opportunity to compare across institutions what student perceptions are about a type of educational approach that is being widely adopted. The results provide a clearer view of the profile of the successful and satisfied web-based student and identify factors that contribute to that success and satisfaction. While the factors identified vary in the strength of their relationship to satisfaction and success, these results do have important implications for both the scholarly literature and for professional practice.

The study raises a number of questions related to the relationship of gender to student satisfaction and success and to the relationship of discipline to the structure of the web-based course. Future research can address these relationships to clarify the relationship between students' perceptions of satisfaction and success and the type of learning activities and experiences they encounter in web-based distance courses based on field of study. Future research should also investigate if a link exists between such factors as cost of web-based course tuition or physical location of students taking web courses and students' satisfaction and success.

What is the significance of having a profile of the successful and satisfied student of web-based learning? The profile gives instructors, program developers and course designers the opportunity to define the structure of web-based courses to incorporate learning activities that stimulate the sense of community and support structure that students appear to miss from their traditional course experiences. Such activities and structures by their nature draw students into higher levels of participation. By so doing they can help the dropout-sensitive students to remain more fully engaged in web courses and lower the risk of such students dropping out. A fully-engaged student may be better able to resist the circumstance-centered pressures that can influence decisions to dropout.

For higher education administrators and decision makers, understanding the profile of a successful and satisfied student can guide decisions they make about investing time, resources and effort into the development of web-based courses and programs. Tapping into a new market of potential students, particularly the working adult, is appealing to many administrators and policy makers. Forging ahead with the development of web courses and programs is time consuming and expensive. As many higher education institutions such as Cornell, SUNY Buffalo and others have found out, such web-based endeavors are not necessarily assured of financial success.

The program development decision making process should consider those factors that affect student satisfaction and success as a part of the planning process. Such consideration can be an integral part of new program success. Distance students seek opportunities to learn without having to come to campus. They also make decisions and choices based on their satisfaction and success with the learning opportunities available

to them. What better way to help assure that web-based programs have a higher potential for success than to incorporate factors known to be positively associated with student satisfaction and success?

If this sounds like a market driven approach to higher education, it is. As higher education institutions move ahead in the new millennium, they are moving into a more market driven environment as for-profit institutions vie for the educational customer – traditional and non-traditional. This movement creates a tension between the desire of program developers to provide what they perceive to be high quality and engaging web-based courses and the desire of administrators to create financially successful web-based programs that tap this new market of students.

Foundations, such as Sloan, fueled the "quick-to-market" approach of web-streaming lectures as they gave substantial grants to highly respected institutions such as Stanford and the University of Illinois. These higher education institutions were in the web-course market early and were looked upon as standard setters for the other institutions. The Sloan Foundation no longer gives large grants for the web-streaming of courses lectures. Instead, they developed and support the Asynchronous Learning Network of grantees and other interested institutions and individuals to promote the development of collaborative and active-based learning approaches for use in web-based courses and programs.

Businesses learned long ago that a satisfied customer is a returning customer prompting many businesses to offer money back guarantees on their products and services. While higher education institutions are not necessarily in a position to adopt a

money-back guarantee policy, they are in a position to put forth web-based programs that make concerted efforts to include learning and support activities that are known to stimulate student satisfaction with and success in the web-learning endeavor.

In conclusion, if administrators and program developers will pay attention to such factors as which students tend to be less comfortable with computers or with working on web and which students are more likely to need higher levels of communication or interactivity with instructors and those supporting web courses, they will have a better opportunity to create and offer web-based courses that maximize student completion rates and stimulate higher levels of student satisfaction. Such decisions made on the front end of the planning and decision making process can help to insure the wise investment of scarce time and financial resources into the development of web programs that have good opportunity to prove financially viable in the short and long term.

APPENDIX A

COMPOSITE VARIABLES

Table A1
Overall Satisfaction (N=89)

	M	SD
Taking a web-based course is more convenient	6.00	1.48
Taking a web-based course is boring (R)	5.30	1.56
When I became very busy with other things, I was more likely to stop (R)	4.18	1.92
I would not take another web-based course (R)	6.07	1.64
I found the online course a better learning experience than face-to-face	3.47	1.59
I gained skills that are useful in my actual or chosen profession	5.83	1.32
I spent too much time trying to log onto the course website (R)	6.06	1.41
I spent too much time surfing the Web instead of studying (R)	5.80	1.47
I would recommend taking web-based courses to friends or associates	5.58	1.70
I found learning online to be frustrating (R)	5.54	1.60
This course contributed to my educational or personal development	5.92	1.42
This was one of the best courses I have taken	4.40	1.83
The pace of the course was just about right for me	4.78	1.45
Overall I was very satisfied with this web-based learning experience	5.18	1.20

Notes: (R) indicates item was reversed for scoring; Scale = 1 to 7; Alpha = .89

Table A2
Personal Self-Efficacy (N=87)

	M	SD
When I get what I want it's usually because I worked hard for it	5.97	1.30
When I make plans I am almost certain to make them work	5.70	1.23
I prefer games involving some luck over games requiring pure skill (R)	4.76	1.69
I can learn almost anything if I set my mind to it	6.01	1.33
My major accomplishments are entirely due to hard work and intelligence	5.68	1.33
I usually don't make plans because I have a hard time following through on them	5.45	1.70
Competition encourages excellence	5.27	1.69
The extent of personal achievement is often determined by chance (R)	5.22	1.48
On any sort of exam or competition I like to know how well I do relative to everyone else	5.24	1.74
Despite my best efforts I have few worthwhile accomplishments (R)	5.85	1.47

Notes: (R) indicates item was reversed for scoring; Scale = 1 to 7; Alpha = .77

Table A3
Interpersonal Control (N=84)

	M	SD
I have no trouble making and keeping friends	5.19	1.64
I can usually establish a close personal relationship with someone I find sexually attractive	4.49	1.59
Even when I'm feeling self confident about most things, I still seem to lack the ability to control interpersonal situations (R)	5.23	1.48
I'm not good at guiding the course of a conversation with several others (R)	5.10	1.62
When being interviewed I can usually steer the interviewer toward the topics I want to talk about and away from those I wish to avoid	4.07	1.46
If I need help in carrying out a plan of mine, it's usually difficult to get others to help (R)	5.24	1.50
It there's someone I want to meet I can usually arrange it	4.83	1.35
I often find it hard to get my point of view across to others (R)	5.14	1.47
In attempting to smooth over a disagreement I usually make it worse (R)	5.47	1.46
I find it easy to play an important part in most group situations	5.08	1.31

Notes: (R) indicates item was reversed for scoring; Scale = 1 to 7; Alpha = .80

Table A4
Current Feelings About Using Computers (N=87)

	M	SD
Stimulating – Dull (R)	5.94	.87
Fun – Dreary (R)	5.96	.86
Easy – Difficult (R)	5.81	1.23
Personal – Impersonal (R)	4.18	1.60
Hindering – Helpful	5.67	1.28
Threatening – Unthreatening	5.98	1.20
Efficient – Inefficient (R)	5.86	1.19
Reliable – Unreliable (R)	5.19	1.22

Notes: (R) indicates item was reversed for scoring; Scale = 1 to 7; Alpha = .81

Table A5
Current Feelings About the World Wide Web (N=90)

	M	SD
Stimulating – Dull (R)	5.87	1.05
Fun – Dreary (R)	5.91	1.09
Easy – Difficult (R)	6.04	1.08
Personal – Impersonal (R)	4.14	1.74
Hindering – Helpful	5.99	1.14
Threatening – Unthreatening	5.73	1.28
Efficient – Inefficient (R)	5.23	1.58
Reliable – Unreliable (R)	4.76	1.46

Notes: (R) indicates item was reversed for scoring; Scale = 1 to 7; Alpha = .83

Table A6
Level of Communication (N=71)

	M	SD
Using online discussion made me communicate more with my fellow students	4.38	2.01
The bulletin board made a positive contribution to my learning	4.72	2.09
The web conference discussions made a positive contribution to my learning	3.90	2.59
The use of the chat room helped me to learn the course materials	2.87	2.60
There were sufficient opportunities to interact online with classmates	4.69	1.97
I like having email connection with my instructor	4.76	1.34
Having email provided timely access to my instructor	5.56	1.68
Computer conferencing gave me timely feedback from my instructor	3.17	2.91
The posting of Frequently-Asked-Questions (FAQ's) on the website helped me to move forward with my online studies	4.10	2.79

Notes: (R) indicates item was reversed for scoring; Scale = 1 to 7; Alpha = .78

Table A7
Rapidity of Communication Flow (N=90)

	M	SD
I received responses to my email questions within 24 hours from my instructor	5.23	1.91
Receiving responses to my email questions in a timely manner motivated me to complete assignments	5.19	2.16
In general, my instructor returned graded assignments in a timely manner	4.51	2.22

Notes: (R) indicates item was reversed for scoring; Scale = 1 to 7; Alpha = .81

APPENDIX B

SURVEY A FOR COMPLETING STUDENTS

Survey of Graduate Students' Perceptions of Web-based Courses

Important Note: The purpose of this survey is to gather information about students' perceptions of satisfaction, success and participation in web-based distance learning courses. Participation in this survey is voluntary and your responses will be kept confidential. Non-participation in this study will not jeopardize student progress. Completion of the survey below will constitute informed consent in this study.

Instructions: To complete the survey, click on your choice of response for each question or item. Several items will request that you rate perceptions about a statement on a scale with each end of the scale labeled. Pick the number along the continuum that represents how strongly you disagree or agree with the statement. Once you have completed the survey, ***be sure to click the "SUBMIT FORM" button to save your responses***. You can make changes of any individual answers by clicking on your new choice of answer prior to clicking the "SUBMIT FORM" button..

Experience with Computers and the World Wide Web (Web)

Which of the following best describes your experience with computers?

- ○ I am a novice: seldom or never use computers.
- ○ I occasionally use computers.
- ○ I frequently use a computer at home.
- ○ Use of computers is central to my professional work.
- ○ Use of computers is central to my studies.

Which of the following best describes your experience with the World Wide Web?

- ○ I am a novice: seldom if ever surf the Web.
- ○ I occasionally surf the Web.
- ○ I frequently surf the Web at home
- ○ Use of the Web is central to my professional work.

○ Use of the Web is central to my studies.

For each of the following pairs of words, on a scale of 1 to 7 please indicate the response that is closest to your CURRENT FEELINGS ABOUT USING COMPUTERS. For instance, for the first pair of words, if you feel computers in general are "completely stimulating" to use and not at all "dull", check "1"; "4" means that you are undecided or think that they are equally likely to be stimulating or dull; "3"means you feel that they are slightly more stimulating than dull, etc.

	1	2	3	4	5	6	7	
Stimulating	○	○	○	○	○	○	○	Dull
Fun	○	○	○	○	○	○	○	Dreary
Easy	○	○	○	○	○	○	○	Difficult
Personal	○	○	○	○	○	○	○	Impersonal
Hindering	○	○	○	○	○	○	○	Helpful
Threatening	○	○	○	○	○	○	○	Unthreatening
Efficient	○	○	○	○	○	○	○	Inefficient
Demanding	○	○	○	○	○	○	○	Obliging
Reliable	○	○	○	○	○	○	○	Unreliable

For each of the following pairs of words, on a scale of 1 to 7 please indicate the response that it closest to your CURRENT FEELINGS ABOUT THE WORLD WIDE WEB. For instance, for the first pair of words, if you feel the Web in general is "completely stimulating" to use and not all "dull", check "1"; "4" means that you are undecided or think that they are equally likely to be stimulating or dull; "3"means you feel that they are slightly more stimulating than dull, etc.

	1	2	3	4	5	6	7	
Stimulating	○	○	○	○	○	○	○	Dull
Fun	○	○	○	○	○	○	○	Dreary
Easy	○	○	○	○	○	○	○	Difficult
Personal	○	○	○	○	○	○	○	Impersonal
Hindering	○	○	○	○	○	○	○	Helpful
Threatening	○	○	○	○	○	○	○	Unthreatening
Efficient	○	○	○	○	○	○	○	Inefficient

Demanding	○	○	○	○	○	○	○	Obliging
Reliable	○	○	○	○	○	○	○	Unreliable

Course Participation

Which of the following learning activities were included as a part of your course? *Check all that apply.*

- ☐ Live online chat discussions
- ☐ Web-based small group collaborative projects
- ☐ Bulletin board/conference discussions
- ☐ Student developed list of supplemental web sites (webliography)
- ☐ Student home pages
- ☐ Web-based reading assignments
- ☐ None of the above
- ☐ Other _____

In which of the following learning activities was participation required as a part of your grade? *Check all that apply.*

- ☐ Live online chat discussions
- ☐ Web-based small group collaborative projects
- ☐ Bulletin board/conference discussions
- ☐ Student developed list of supplemental web sites (webliography)
- ☐ Student home pages
- ☐ Web-based reading assignments
- ☐ None of the above
- ☐ Other _____

On a scale of 1 to 7 indicate how strongly you agree or disagree. (1 = Strongly Disagree; 7 = Strongly Agree; N/A = Not Applicable)

	Strongly Disagree						Strongly Agree	
	1	2	3	4	5	6	7	N/A
Using online discussion made me communicate more with my fellow students.	○	○	○	○	○	○	○	○
I felt inhibited in taking part in online discussion sessions.	○	○	○	○	○	○	○	○
The bulletin board made a positive contribution to my learning.	○	○	○	○	○	○	○	○
The web conference discussions made a positive contribution to my learning.	○	○	○	○	○	○	○	○
The use of the chat room helped me to learn the course materials.	○	○	○	○	○	○	○	○
I found participating in live chats to be frustrating.	○	○	○	○	○	○	○	○
Collaborative online group activities helped me to succeed in the course.	○	○	○	○	○	○	○	○
Online collaborative activities took too much of my time.	○	○	○	○	○	○	○	○
	1	2	3	4	5	6	7	N/A
Identifying additional web sites to supplement course materials positively contributed to my learning.	○	○	○	○	○	○	○	○
Having student home pages helped me feel a part of the class.	○	○	○	○	○	○	○	○
There were sufficient opportunities to interact online with classmates.	○	○	○	○	○	○	○	○
Access to online lecture notes made a positive contribution to my learning.	○	○	○	○	○	○	○	○
The web-streamed lectures made a positive contribution to my learning.	○	○	○	○	○	○	○	○

On a scale of 1 to 7 indicate how strongly you agree or disagree. (1 = Strongly Disagree; 7 = Strongly Agree; N/A = Not Applicable)

	Strongly Disagree						Strongly Agree	
	1	2	3	4	5	6	7	N/A
Having email provided timely access to my instructor.	○	○	○	○	○	○	○	○
Computer conferencing gave me timely feedback from my instructor.	○	○	○	○	○	○	○	○
I like having email connection with my instructor.	○	○	○	○	○	○	○	○
I received responses to my email questions within 24 hours from my instructor.	○	○	○	○	○	○	○	○
Receiving responses to my email questions in a timely manner motivated me to complete assignments.	○	○	○	○	○	○	○	○
I waited for an email response to my question from my instructor before continuing my online participation.	○	○	○	○	○	○	○	○
The posting of Frequently-Asked-Questions (FAQ's) on the website helped me to move forward with my online studies.	○	○	○	○	○	○	○	○
In general, my instructor returned graded assignments in a timely manner.	○	○	○	○	○	○	○	○

When I asked my instructor a question by email I typically received an answer within:

- ○ Four hours
- ○ Less than a day (5-24hrs.)
- ○ Two days

- ○ Three or more days, but less than a week
- ○ A week or more
- ○ Never
- ○ I did not ask questions by email

I received individual assistance from my instructor when I needed it.

○ Yes ○ No

Which of the following most accurately describes where you sought technical assistance with your web-based course? *Check all that apply.*

- ☐ Student help line (800 number)
- ☐ Internet Service Provider (ISP)
- ☐ Software Manufacturer (WebCT, Blackboard, etc.)
- ☐ Another student
- ☐ Instructor
- ☐ Teaching Assistants
- ☐ Did not need help
- ☐ Other _____

On a scale of 1 to 7 indicate how strongly you agree or disagree. (1 = Strongly Disagree; 7 = Strongly Agree; N/A = Not Applicable)

	Strongly Disagree						Strongly Agree	
	1	2	3	4	5	6	7	N/A

I needed a lot of help to access course materials on the Web.	○	○	○	○	○	○	○	○
Accessing course information using a web browser such as Netscape or Internet Explorer was easy to do.	○	○	○	○	○	○	○	○
My instructor gave me enough information so that I could successfully access course materials.	○	○	○	○	○	○	○	○
Technical support from the student help line was available whenever I needed it.	○	○	○	○	○	○	○	○
Teaching assistants provided helpful information when I requested it.	○	○	○	○	○	○	○	○
I was able to access the course website whenever I needed.	○	○	○	○	○	○	○	○
I was able to download from the Web any additional software applications (such as Acrobat Reader, Flash, Real Player, etc.) that I needed to complete course activities.	○	○	○	○	○	○	○	○

How important was each of the following reasons for your taking this web-based course?

	Very Important	Somewhat Important	Not Important
I have a professional or job-related interest in the course topic.	○	○	○
My company paid for me to take the course.	○	○	○
I have a general interest in the course topic.	○	○	○
The course is required by my major.	○	○	○
The course is required for graduation.	○	○	○
The reputation of the instructor.	○	○	○
I was curious about what it was like to take a web-based course.	○	○	○
More convenient than going on campus to take traditional classes.	○	○	○
Cannot go to campus to take traditional classes.	○	○	○

What were your goals for this web-based course? *Check all that apply*.

- ☐ Earn a passing grade
- ☐ Learn the course content
- ☐ Develop skill in applying knowledge gained through the course
- ☐ Learn a new technology
- ☐ Experience web-based online learning
- ☐ Learn to navigate the Web
- ☐ Other _____

Images of Yourself

Please read each of the following statements and indicate how much you agree or disagree (1 = Strongly Disagree; 7 = Strongly Agree)

	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
When I get what I want it's usually because I worked hard for it.							
When I make plans I am almost certain to make them work.							
I prefer games involving some luck over games requiring pure skill.							
I can learn almost anything if I set my mind to it.							
My major accomplishments are entirely due to hard work and intelligence.							
I usually don't make plans because I have a hard time following through on them.							
Competition encourages excellence.							
The extent of personal achievement is often determined by chance.							
On any sort of exam or competition I like to know how well I do relative to everyone else.							
	1	2	3	4	5	6	7
Despite my best efforts I have few worthwhile accomplishments.							
I have no trouble making and keeping friends.							
I can usually establish a close personal relationship with someone I find sexually attractive.							
Even when I'm feeling self confident							

about most things, I still seem to lack the ability to control interpersonal situations.							
I'm not good at guiding the course of a conversation with several others.	○	○	○	○	○	○	○
When being interviewed I can usually steer the interviewer toward the topics I want to talk about and away from those I wish to avoid.	○	○	○	○	○	○	○
If I need help in carrying out a plan of mine, it's usually difficult to get others to help.	○	○	○	○	○	○	○
	1	2	3	4	5	6	7
If there's someone I want to meet I can usually arrange it.	○	○	○	○	○	○	○
I often find it hard to get my point of view across to others.	○	○	○	○	○	○	○
In attempting to smooth over a disagreement I usually make it worse.	○	○	○	○	○	○	○
I find it easy to play an important part in most group situations.	○	○	○	○	○	○	○

Perceptions of Satisfaction and Success

On a scale of 1 to 7 indicate how strongly you agree or disagree. (1 = Strongly Disagree; 7 = Strongly Agree)

	Strongly Disagree						Strongly Agree

	1	2	3	4	5	6	7
Taking a web-based course is more convenient.							
Taking a web-based course is boring.							
When I became very busy with other things, I was more likely to stop.							
I would NOT take another web-based course.							
I found the online course a better learning experience than most face-to-face courses.							
I gained skills that are useful in my actual or chosen profession.							
I spent too much time trying to log onto the course website.							
I spent too much time surfing the Web instead of studying.							
I would recommend taking a web-based course to friends or associates.							
I found learning online to be very frustrating.							
	1	2	3	4	5	6	7
This course contributed to my educational, professional or personal development.							
This was one of the best courses I have taken.							
The pace of the course was just about right for me.							
Overall I was very satisfied with this web-based learning experience.							

What one or two things did you like **BEST** about your web-based course?

1.
2.

What one or two things did you like **LEAST** about your web-based course?

1.
2.

How do you define successful completion of your web-based course?

- Earn an A
- Earn a B or better
- Earn a C or better
- Other

At the beginning of the course, what grade did you expect to earn?

- A
- B
- C
- D
- Incomplete

What grade did you earn in this course?

- A
- B
- C
- D
- Incomplete

General Information

Course Name: (*required information*)

I took this web-based course through: (*required information*)

- Site A
- Site B
- Site C

If you feel that any of the following items invade your privacy, you are free to decline to answer them.

I am: Female Male

My age at my last birthday:

- 18-24
- 25-34
- 35-44
- 45-54
- 55 or older

I am enrolled in a graduate degree program. Yes No

How I paid for this course: *Check all that apply*.

- Personal funds
- Academic scholarship
- Loans from relative(s)
- Stafford loan

- ☐ Employer reimbursed me
- ☐ Employer scholarship or fellowship
- ☐ Other

I would rate my typing/keyboarding skills as:

- ○ None
- ○ Hunt & peck
- ○ Okay
- ○ Good
- ○ Excellent

How many online courses have you previously taken?

- ○ None
- ○ One
- ○ Two or more

About how much **total time** did you spend **EACH WEEK** on this course including all online and offline activities associated with the course?

- ○ Less than one hour
- ○ 1 - 2 hours
- ○ 3 - 5 hours
- ○ 6 - 9 hours
- ○ 10 - 12 hours
- ○ 13 or more hours

Thank you for completing this survey.

Be sure to click the "SUBMIT FORM" button NOW to save your responses.

Exiting the survey without clicking

"SUBMIT FORM" button will erase your answers.

If you are interested in entering the drawing, you will be given an opportunity to submit your email address

for the drawing for the two gift certificates.

To protect your privacy, email addresses will be deleted immediately following the drawing.

Submit Form

APPENDIX C

SURVEY B FOR NON-COMPLETING STUDENTS

Survey of Graduate Students' Perceptions of Web-based Courses

Important Note: The purpose of this survey is to gather information about the reasons that students choose to drop a web-based distance learning course. Participation in this survey is voluntary and your responses will be kept confidential. Non-participation in this study will not jeopardize student progress. Completion of the survey below will constitute informed consent in this study.

Instructions: To complete the survey, click on your choice of response for each question or item. Several items will request that you rate perceptions about a statement on a scale with each end of the scale labeled. Pick the number along the continuum that represents how strongly you disagree or agree with the statement. Once you have completed the survey, ***be sure to click the "SUBMIT FORM" button to save your responses***. You can change any answer by clicking on your new choice of answer prior to clicking the "SUBMIT FORM" button..

Course Name: _____

I took this web-based online course through:

- ○ Site A
- ○ Site B
- ○ Site C

I am: ○ Female ○ Male

My age at my last birthday:

- ○ 18-24
- ○ 25-34
- ○ 35-44
- ○ 45-54

- 55 or older

I am enrolled in a graduate degree program. Yes No

I would rate my typing/keyboarding skills as:

- None
- Hunt & peck
- Okay
- Good
- Excellent

How many online courses have you previously taken?

- None
- One
- Two or more

How do you define successful completion of a web-based course?

- Earn an A
- Earn a B or better
- Earn a C or better
- Other

At the beginning of the course, what grade did you expect to earn?

- A
- B
- C
- D
- Incomplete

How important was each of the following factors in your decision to drop the online course?

	Very Important	Somewhat Important	Not Important
Health problems or personal problems.	○	○	○
The course was too hard.	○	○	○
The course was too much work.	○	○	○
I did not like the instructor.	○	○	○
The subject matter was boring or irrelevant.	○	○	○
I had too many other courses and needed to drop one (or more).	○	○	○
I was not doing well in the class.	○	○	○
I did not like the web-based learning approach.	○	○	○
I had too many outside demands (e.g. other classes, full-time work).	○	○	○
The course did not match my expectations.	○	○	○
I had trouble logging on to the course website.	○	○	○
It took too long to download course materials such as course notes or lectures.	○	○	○

	Very Important	Somewhat Important	Not Important
I don't like to read online.	○	○	○
I didn't feel a part of the class.	○	○	○
The instructor did not respond to my emailed questions in a timely manner.	○	○	○
There was no one to help me work through my technical problems with the course.	○	○	○
I missed being in a classroom with the instructor and other students.	○	○	○
I changed jobs or my level of responsibilities increased at work..	○	○	○
My work-related travel increased.	○	○	○

Please read each of the following statements and indicate how much you agree or disagree (1 = Strongly Disagree; 7 = Strongly Agree)

	Strongly Disagree						Strongly Agree
	1	2	3	4	5	6	7
The course did not meet my expectations.	○	○	○	○	○	○	○
If I have the opportunity, I will register for another web-based online course.	○	○	○	○	○	○	○

What one or two things did you like **BEST** about your web-based course?

1.

2.

What one or two things did you like **LEAST** about your web-based course?

1.

2.

Additional comments?

Thank you for completing this survey.

Be sure to click the "SUBMIT FORM" button NOW to save your responses. Exiting the survey without clicking "SUBMIT FORM" button will erase your answers.

If you are interested in entering the drawing, you will be given an opportunity to submit your email address for the drawing for the two gift certificates. *To protect your privacy, email addresses will be deleted immediately following the drawing.*

Submit Form

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