Investigating the Impact of E-Learner Cognitive Style on the Predictive Value of Student Success in Online Distance Education Courses

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Investigating the Impact of E-Learner Cognitive Style on the Predictive Value of Student Success in Online Distance Education Courses

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

Lynn University

By

Heather Butler

Lynn University

April 2008
Investigating the Impact of E-learner Cognitive Style on the Predictive Value of Student Success in Online Distance Education Courses

By Heather Butler

Lynn University, 2008

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ABSTRACT

Currently, online professional development is growing rapidly in business and industry. The purpose of this study was to determine whether learners’ cognitive styles influenced the learners’ online course satisfaction and the possible relationships with student demographic characteristics. 83 participants of a Southeast Florida public school district completed the data-gathering instruments. Data was entered into a Statistical Package for the Social Science (SPSS) computer program for statistical analyses. Results suggest that cognitive learning styles influence a learner’s online course satisfaction. Furthermore, certain student demographic characteristics effect online course satisfaction. Successful experience in an online learning environment increases student achievement.
ACKNOWLEDGEMENTS

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I would also like to extend a very big thank you to my committee members, Dr. Tebes and Dr. Jackman for their support during this time. A special thank you to my distance education content expert, Dr. Tebes. She took the time to go over everything with me and for this I will always be grateful. A special thank you to Dr. Jackman as well for joining this committee in the middle of the process.

Last, but not least, my family and friends who never stopped supporting me through this process.
CHAPTER I
INTRODUCTION TO THE STUDY

Due to the popularity of distance education, many higher education institutions offer an increasing number of distance education opportunities. In four-year higher education institutions, 90% of public schools currently offer online distance learning and 50% of private schools offer it as well (Distance Learning Today, 2007). This growth is considerable compared with the 2000-2001 academic year, 56% (2,320) of all 2-year and 4-year Title IV-eligible, degree-granting institutions offered distance education courses for any level or audience (NCES, 2005). In the fall 2005 term, there were approximately 3.2 million students enrolled in at least one distance education course in the United States (Allen & Seaman, 2006). That accounts for one in six higher education students (Pope, 2006). Exclusive online students represent 7% of all postsecondary students in the United States at the end of 2005 (Distance Learning Today, Media Kit, 2007).

Based on this rapid growth of distance education, by 2011 the majority of students will be participating in online courses (Distance Learning Today, Media Kit, 2007). In 2004 the US military created eArmyU which enabled members of the armed services to participate in online
programs from 28 colleges and universities, and currently offers 145 certificate and degree programs (Heeger, 2007). The Board of Regents for the University System of Maryland began to encourage students to enroll in at least 12 credits of online courses (Heeger, 2007).

The evolution of distance education began with correspondence courses and progressed to the World Wide Web. The advancements of technology and telecommunications have changed the methods of educational delivery to allow access to e-learning. The availability of the Internet, course management software, and video streaming has accelerated the growth of distance education. Web-based courses are a convenient learning method for many students who for a variety of reasons cannot commute to a traditional campus. The introduction of e-learning is a promising solution to this challenge and provides an opportunity to enable anyone, anywhere, at any time, access to learning (Zhang & Zhou, 2003). The progression of distance education into the 21st Century has consequently prompted the need to study cognitive learning styles, online course satisfaction, and student demographic characteristics to gain a better understanding of online educational needs.
There are several benefits in taking an online education course; however, online education does not meet the needs of every student. Online education offers the flexibility of working at one's own pace, time, and location. With online distance education, students set their own time schedules (asynchronous learning) and the coursework is more portable (Zhang et al., 2003). Unfortunately, online education is in its infancy in the education world and there are barriers that must be overcome. "Problems and barriers encountered by the student fall into several distinct categories: costs and motivators, feedback and teacher contact, lack of experience, and training" (Galusha, 1997, p. 4). Online learning encompasses a myriad of situations that may hinder or enhance the experience of an e-learner, which will be discussed in the literature review of this study.

**Distance Education Definition and Organization**

Several distance education models have evolved over time with the advancements of technology. Distance education began through print-based correspondence and advanced to technology-based communications. The United States Distance Learning Association defined distance education as:
The acquisition of knowledge and skills through mediated information and instruction. Distance learning encompasses all technologies and supports the pursuit of lifelong learning for all (1998).

There are three different modes of operation in which distance education can operate. These modes are explained as the following: sole responsibility, mixed mode, and consortium (Rumble, 1986). An example of a sole responsibility operation would be that of the Open University located in the United Kingdom. The sole purpose of this institution and the administration is distance education. The mixed mode institutions are involved with both the traditional methods and distance education methods (Rumble, 1986). Most American universities are representative of this type of operation. The consortium mode of operation offered by Rumble is a group of institutions or distance education programs devoted to distance education as a means of broadening or sharing distance education programming (1986). This would be very convenient for the students to be able to take courses offered at different times through different institutions to meet their personal scheduling needs.

**Implications of Distance Education**

The implications of online learning encompass a multitude of situations, both intrinsic and extrinsic to
the online course. According to Galusha (1997), the cost and motivators, feedback and teacher contact, and lack of experience and training are among the issues of concern for online distance education students. Don Tapscott (1998) defines the Network Generation as the "generation of children who, in 1999, were between the ages of two and twenty-two" (p. 3). This generation of children has grown up in a world rich with digital media. The Network Generation culture is comfortable with the Internet and technology, according to Don Tapscott, author of Growing Up Digital: The Rise of the Net Generation (1998). Tapscott has created eight shifts of interactive learning to include the following:

1. From linear to hypermedia learning
2. From instruction to construction and discovery
3. From teacher-centered to learner-centered education
4. From absorbing material to learning how to navigate and how to learn
5. From school to lifelong learning
6. From one size fits-all to customized learning
7. From learning as torture to learning as fun, and
8. From the teacher as transmitter to the teacher as facilitator. (1998)

**Cognitive Learning Styles**

Educators have examined cognitive learning styles since the 1970s in an effort to comprehend the various ways that learners perceive information within the instructional environment. Herman Witkin's field-dependence and field-
independence is one of the most widely investigated cognitive learning styles, measured by the Group Embedded Figures Test (GEFT). Witkin's initial work primarily concentrates on visual cues to working-out conflicts.

The GEFT assists in determining whether a learner is field-dependent or field-independent. This is beneficial to distance educators because the field-dependent learner is more acquainted with social activities, whereas a field-independent learner favors solitary activities (Brennar, 1997). Therefore, a distance education course might benefit a field-independent learner more than a field-dependent learner. The field-dependent learner's needs to socialize and interact with people would be a shortcoming in a distance education instructional setting (Brennar, 1997).

Varying learning styles of field-dependent and field-independent learners influence their degrees of self-directed learning (Ching, 1998). Field-dependent learners are not self-directed learners, whereas, field-independent learners are autonomous (Ching, 1998).

**Online Course Satisfaction**

Due to the influx of distance education courses in institutions worldwide, it has become necessary to develop a tool for the evaluation of learning environments in interactive environments (Chang & Fisher, 1999). A
framework of Web-based learning environment instruments was established and built based on the work of Tobin (1998), (Chang et al., 1999). The Web-Based Learning Environment Inventory (WEBLEI) describes students’ perceptions of a Web-based learning environment. Besides the student demographics and background sections, there are four scales included in the WEBLEI. Of these four scales, the initial three are adapted from Tobin’s (1998) Connecting Communities Learning (CCL), and the remaining section concentrates on the information structure and the Web-based material design (Chang et al., 1999).

**Student Demographic Characteristics**

A study conducted by Meyen, Aust, Gauch, Hinton et al. (2002) discovered that there is a relationship between e-learner attributes and e-learning instructional designs when examining pedagogical effectiveness. The e-learner attributes considered in this study were: “age, gender, area of origin (where they are from), ethnicity, race, learning styles, first language, socioeconomic status, intellectual ability, previous educational experience, as well as learning challenges associated with disability” (Meyen et al., 2002, p. 43). It is a possibility that these attributes affect the performances of e-learners. Packham et al. (2004) claim that participation in distance
education courses is affected by the learners' technological abilities.

The lack of technology access among certain members of the population is referred to as the "digital divide." (Maffett, 2008). The "digital divide" may be influenced by several variables, including ethnicity, income, level of education, and age (U.S. Department of Commerce, 2002). In today's technology-driven world, failure to tackle the increasing gap of those who have access to computer technologies and those who don't—the so-called digital divide—perpetuates the inequities that are already prevalent to many developing societies (Werthein, 2008).

According to Meyen et al. (2002), the present knowledge base on students with disabilities:

Suggests that instructional design features should offer a variety of options to accommodate this student population. In generalizing to e-learning environments, one might assume this would apply; that is, content-rich, multimedia Web pages offering user-interactive illustrations to anchor their comprehension for future applications of what they are learning (p. 42).

Distance education programs must be designed to accommodate the needs of every type of learner and not just the traditional type of student (Roblyer, 2003). By raising awareness to varying student demographics including gender and diversity institutions are able to better market their
distance education programs (Lee, 2007). The goal is to develop a systematic approach in researching the technical and pedagogical factors that have an effective influence on e-learning environments for all learners, even those with disabilities (Meyen et al., 2002). The main focus of a successful distance education program is to provide the opportunity of education to learners regardless of their personal circumstances (Roblyer, 2003). One of the great attractions of online learning is flexibility, which for many mature adults is valued as they try to balance work, family, and study requirements (Appana, 2008).

Purpose of the Study

The general purpose of this causal-comparative quantitative study was to investigate the relationships between cognitive learning styles, student demographic characteristics and online course satisfaction within a Web-based distance education environment. There are two separate characteristics of cognitive learning style measured by field independence and field dependence. The student demographic characteristics include first language, age, gender, number of hours working per week, race, marital status, familial status, and college degree level. Online course satisfaction includes students' perceptions across four scales: access, interaction, response, and
results. The specific purposes of this exploratory study involved the use of multiple regression analysis, and analysis of variance to examine the following:

1. The relative contribution of student demographic characteristics having a predictive value on cognitive learning style.
2. The relative contribution of cognitive learning style having a predictive value on online course satisfaction.
3. The relative contribution of student demographic characteristics having a predictive value on online course satisfaction.

Definition of Terms

A considerable amount of scholarly literature related to online distance education comes from the field of education. Theoretical definitions of the variables and key terms in this study are established on commonly used meanings in the educational research studies and theoretical literature reviewed for the purposes of this proposed study. Operational definitions of variables are established on the specific means by which they are observed and measured in this study.
Independent Variable

Cognitive Learning Style

Theoretical Definition: Field-dependent learners are not self-directed learners whereas field-independent learners are autonomous (Ching, 1998).

Operational Definition: Measured by Witkin's field dependence (FD) and field independence (FI) Group Embedded Figures Test (GEFT). Uses visual cues to resolve conflicts, such as the rod and frame test that determines a subject's reliance on visual cues, as opposed to gravitational cues, in adjusting a rod to the vertical position within a tilted square frame. Subjects relying on visual cues are considered field-dependent, those subjects relying on body cues are considered field-independent. GEFT determines if a subject is FI or FD by his or her ability to disembend a figure from a more complex visual field. The GEFT consists of 3 sections comprising of 18 items. The test takes approximately 20 minutes to complete.

Dependent Variables

Student Demographic Characteristics

Theoretical Definition: According to Meyen et al. (2002): Basic characteristics including age, gender, disability, area of origin and residence, ethnicity, race, first language, learner's ability, subject matter
experience, learner’s perception, and educational history (p. 41). The study will include the following descriptive statistics: age, gender, first language, marital status, familial status, college degree level, number of hours working per week, and technological ability.

**Operational Definition:** A “checklist” for first language, age, gender, number of hours working per week, race, marital status, familial status, college degree level, and technological ability.

**Online Course Satisfaction**

**Theoretical Definition:** A student’s perceptions of a Web-based learning environment based on convenience, efficiency, autonomy, enjoyment, confidence, accomplishments, success, frustration, flexibility, reflection, quality, interaction, feedback, and collaboration (Chang et al., 1999).

**Operational Definition:** Measured by Web-Based Learning Environment Instrument (WEBLEI), (Chang et al., 1999). Measures students’ perceptions across four scales: access, interaction, response, and results. The instrument is comprised of 30 questions with a five-point Likert scale.
Significance of Study

The topic area of students' cognitive learning style and online course satisfaction and student demographic characteristics is significant because of the need to evaluate the techniques used to develop and deliver effective online instruction (Irani, Telg, Scherler & Harrington, 2003; Carter, 2001; Schneider & Germann, 1999; Ching, 1998). Online distance education may be able to "offer support to different types of learners and in each case offer suitable levels of learner control, feedback and reinforcement, flexibility, experimentation, range of choices, and practice all of which can enhance learner attitude and learning performance" (Haseman, Nuipolatoglu & Ramamurthy, 2002, p. 33).

The problem area of students' cognitive learning styles and online course satisfaction needs to be studied due to the growing needs of lifelong learners. "The Internet and its applications in education and industry have significantly influenced how we teach and learn" (Meyen et al., 2002, p. 37). The effectiveness of online education can enhance student learning (Zhang et al., 2003). The National Education Association prepared a report, the Institute for Higher Education Policy (1999)
that identified the following weaknesses in distance education research:

1. Does not consider differences among students;
2. Does not consider different learning styles and how they relate to using specific technologies;
3. Does not include a theoretical or conceptual framework;
4. Does not sufficiently explain why the dropout rate is higher for distance learners.

In addition to these general needs in distance education research, it is important for schools to determine the success rate of students for their own admissions and enrollment purposes.

This study was researchable because it asked scientific questions and contains measurable variables. It is critical to have educational institutions that are equipped with research-driven data that can support the steady increase of students and determine their potential to learn by means of distance education courses. Further research is necessary to clarify the relationships between students' cognitive learning styles, students' demographic characteristics, and students' satisfaction in distance education courses.

This study was feasible because it was implemented within a reasonable amount of time, had readily available subjects, and had measurable concepts within the theoretical framework. The purpose of this causal-
comparative study was to demonstrate the value of using the GEFT and WEBLEI instruments to determine cognitive learning styles; how they influence students' satisfaction in distance education courses; and the influence of the intervening variables of students' demographic characteristics.

**Hypotheses**

This study investigated whether learners' cognitive styles have a predictive value on their online course satisfaction. In addition, this project explored the possible predictive values with student demographic characteristics. Consequently, the principal investigator hypothesized the following:

1. Student demographic characteristics (first language, age, gender, number of hours working per week, race, marital status, familial status, degree level, and technological ability) will not have a predictive value of cognitive learning style (field-dependent/field-independent) ($\alpha < .05$).

2. Cognitive learning styles will not influence online course satisfaction (students' perceptions of an online course) ($\alpha < .05$).

3. Student demographic characteristics will not predict online course satisfaction ($\alpha < .05$).
Research Questions

Based on the previous hypotheses, the following research questions were developed:

1. Which student demographic characteristics have a predictive value on cognitive learning styles?
2. Does cognitive learning style have a predictive value on online course satisfaction?
3. Which student demographic characteristics have a predictive value on online course satisfaction?

Research Design

This study utilizes a causal-comparative quantitative research design to explore the relationships between cognitive learning styles, student demographic characteristics, and online course satisfaction within a Web-based, distance education environment. The three research questions presented above led to the development of a non-experimental survey research study, with descriptive and exploratory purposes.

For question one, a Multiple Regression Model was used to compare the differences in student demographic characteristics (first language, age, gender, number of hours working per week, race, marital status, familial status, number of years between courses, and technology
ability) with cognitive learning style (field-dependent or field-independent). For question two, a Multiple Analysis of Variance (MANOVA) compared the differences between cognitive learning style and online course satisfaction. For question three, a Multiple Regression Model compared differences in student demographic characteristics and online course satisfaction.

Assumptions

Certain assumptions are critical to this study. One assumption was that the learners' cognitive styles influenced their online course satisfaction. In addition to determining which type of cognitive learning style (field-dependent/field-independent) has more success in terms of online course satisfaction, the study sought to determine any relationships that exist between student demographic characteristics, cognitive style, and online course satisfaction. Another assumption was that the survey respondents answered truthfully and to the best of their ability.

Delimitations and Scope

The interpretation of results from this study was confined to the following delimitations and scope. The study's sample was confined to adult learners on a voluntary basis from a Southeast Florida public school
district. This study was limited to one source of participants, due to availability. All participants had experience with distance education courses. The sample size consisted of 83 participants. The participants were able to read, write, and speak English.

The results of the GEFT, WBLEI, and student demographic checklist used in the study assumed that the adult learners responded to all questions independently, honestly, and to the best of their capabilities. The conclusions obtained were limited to the population represented by the sample. This study used a causal-comparative research design and a convenient sample. The researcher did not have dropouts of participants from the study. The limitations to the research design are that the results are not generalized to other settings.

Organization of the Study

Chapter I

This chapter consists of the introduction to the research problem. The subsections include the introduction, statement of the problem, distance education, cognitive learning styles, course satisfaction, purpose of the study, significance of the study, hypotheses, research questions, organization of chapter, and definition of terms.
Chapter II

The second chapter consists of the review of the literature. It augments the comprehension of significant areas of the current body of research pertinent to the problem. Its subsections consist of the overview of distance education, historical perspective, theories of distance education, cognitive learning styles, online course satisfaction, and student demographic descriptors.

Chapter III

The third chapter provides a comprehensive description of the participants and the setting of the study. The subsections consist of the three instruments utilized in this study, which are the GEFT and WEBLEI and Student Demographic Checklist. The chapter concludes with a discussion on the procedures utilized in this study.

Chapter IV

The fourth chapter presents the results of the research study. The subsections include the main analyses, summary of findings and research questions. Data was presented throughout the chapter in multiple tables.

Chapter V

The fifth chapter discusses the results of the study. The subsections include the summary of findings,
conclusions, limitations, recommendations for future research, and implications for practice. This chapter concludes the study’s findings.
CHAPTER II

INTRODUCTION

This research investigated the impact of learners' cognitive learning style (field dependence and independence) in a Web-based, distance education experience, online course satisfaction and the possible relationships with student demographic characteristics. The researcher developed questions in conjunction with an analysis of theories and research on distance education, cognitive learning styles, and online course satisfaction.

Organization of the Review

A literature map was used to guide the library search for theoretical and empirical literature in this review about the impact of cognitive style and student demographic characteristics. The map shows a deductive pattern of cognitive style as either field independence or field dependence and its relationship with student demographic characteristics. The map further identifies how both cognitive style and student demographic characteristics affect online course satisfaction. The concepts of this review are outlined below and their relationships are defined and organized in the literature map.
The problem area of students' cognitive learning styles and online course satisfaction was studied due to the growing needs of lifelong learners (Kartha, 2006 & Williamson & Watson, 2007). With the growing population of e-learners and distance education programs, it has become necessary to develop an evaluative tool to assess the web-based learning environment (Chang et al., 1999 & Lee, Tseng, Liu & Liu, 2007). The topic area of students' cognitive learning styles and online course satisfaction was identified because of the need to evaluate the techniques used to develop and deliver effective online instruction. This chapter summarizes the literature relevant to the research questions of this study.
Literature Review

Overview of Distance Education

Online distance education has become the recent trend for learning. Traditional classroom instruction does not meet all the needs of today's students due to the requirements of actual attendance and schedule conflicts (Fresen, 2007 & Moskal, Dziuban, Upchurch & Truman, 2006). Often students are attracted to online education due to the luxury of not commuting to class (Naqvi, 2006 & Packham et al., 2004). In the fall 2005 term, there were about 3.2 million students enrolled in at least one distance education course in the United States (Allen & Seaman, 2006). The advancements of technology and telecommunications have changed the methods of educational delivery to allow access to e-learning (Mancuso-Murphy, 2007). E-learning has been introduced as a promising solution to educational challenges by providing an opportunity for anyone to access education, anywhere, and at anytime (Moskal et al., 2006 & Zhang et al., 2003).

Growing popularity of distance education compels schools to face the challenge of making their distance education program attractive. According to Adam, Awerbuch, Slonim, Wegner and Yesha, globalization has created the need for emerging methods of instructional delivery and
training in order to enhance traditional methods of acquiring knowledge and to communicate new skills and tools (Zhang et al., 2003). As a result, many schools, both public and private, including various grade levels, integrate distance education into their curriculum to appeal to students. "The growing role of the Internet as the main communication and information delivery channel in society at large will make Web-based learning environments an important vehicle for delivering educational programs to more students at a lower cost" (Peled, 2000, p. 16).

**Varying Definitions of Distance Education**

Several distance education models have evolved through time with the advancements of technology. Distance education began through print-based correspondence and advanced to technology-based communications. The United States Distance Learning Association defined distance education as:

> The acquisition of knowledge and skills through mediated information and instruction. Distance learning encompasses all technologies and supports the pursuit of lifelong learning for all (1998).

Distance education traces its origins back to the early 1700s with correspondence courses. Today distance learning refers to a technology-based distance education. Several distance education models have evolved with the
advancements of technology. Through a meta-analysis, with quantitative syntheses, an empirical study was conducted to review distance education models. According to Bernard et al. (2004):

First-generation DE refers to the early days of print-based correspondence study. Characterized by the establishment of the Open University in 1969, second-generation DE refers to the period when print materials were integrated with broadcast TV and radio, audio- and videocassettes, and increased student rapport. Third-generation DE was heralded by the invention of Hypertext and the rise in the use of teleconferencing (i.e. audio and video). In 2001, Taylor added the “fourth-generation,” characterized by flexible learning (i.e. CMC, Internet-accessible courses) and the “fifth-generation” (i.e. online interactive multimedia, Internet-based access to Web resources) (p. 388).

According to Shale (1989), “Distance education is beset with a remarkable paradox—it has asserted its existence, but it cannot define itself” (p. 25). The Garrison and Shale (1987) definition of distance education provides a minimum criterion for the classification of this technology and suggested the following:

1. Distance education implies that the majority of educational communication between teacher and students occurs non-contiguously.
2. Distance education involves a two-way communication between teacher and student for the purpose of facilitating and supporting the educational process.
3. Distance education uses technology to mediate the necessary two-way communication (pp. 10-11).
According to Bernard et al. (2004) further defines distance education:

In the age of the Internet and computer-mediated communication (CMC), there is a tendency to think of Distance Education in terms of "anywhere, anytime education." Distance Education of this type truly fits Keegan’s 1996 definitional criteria, "the quasi-permanent separation of teacher and learner" and "the quasi-permanent absence of learning groups" (p. 386).

Growth of Virtual Schools

There has been a tremendous growth of online schools in recent years. However, these schools are primarily offering courses supplemental to the traditional high school classes. The Web-based advanced placement courses that are available through Apex Learning are now available in several states, such as Massachusetts, Kentucky, Illinois, Nebraska, and Michigan (Wildavsky, 2001). Traditional universities should enhance their curriculum by offering distance education tools to the classroom (access to course content and resources via Web-based instruction), which will also retain enrollment and possibly increase it (Kartha, 2006 & Peled, 2000).

In addition to academics, some of the virtual schools offer career and technical education courses online. With the growing amount of school violence, many parents want a safer environment in which their children can learn (Mupinga, 2005). Florida Virtual School (FLVS), a virtual
high school program, offers flexible schedules, various enhanced course selections, an opportunity to earn required graduation credits, and individual instruction (Florida Virtual School, 2004).

Florida Virtual School is among the largest publicly funded online high school in the nation (Symonds, 2003). FLVS began as a pilot program in Orange County, Florida, with an enrollment of less than 100 students (DeNardo, 2003). Florida Virtual School has served over 31,000 students in 2005-06, that have enrolled in 68,000 half-credit courses (Florida Virtual Schools [FLVS], 2007). Due to the growing amount of virtual schools in the nation, FLVS serves as a model for success.

The FLVS students are able to work at their own pace, however they do have some deadlines. Students categorized as gifted have the opportunity to excel while at the same time the slower paced students can receive the extra time they need to succeed (FLVS, 2004). The expectations are that students complete half-credit courses in 18 weeks and full-credit courses in 36 weeks (Shanklin, 2004). Usually only about 20% complete the course requirements before the deadline (Shanklin, 2004). Parents are able to view their students' progress because the information is accessible online. This is an advantage for many parents because
students who are struggling often hide their grades until it is too late.

Another benefit of FLVS is that it has plagiarism software that scans submitted essays. This convenient feature catches students who copy published work. Most traditional schools do not have this software available to them unless the teachers purchase it privately.

**e-Learning Programs for Educators**

Over the last few years, e-Learning has become very popular among educators (Galley, 2002). According to the Association for Supervision and Curriculum Development, online courses are rapidly becoming a widespread form of teacher professional development (Seal, 2003). Several states, districts, universities, colleges of education, regional service providers, and for-profit and non-profit companies are beginning to offer an extensive variety of online innovative programs. This format of instructional delivery provides quality experiences for educators that result in their implementation of technologies as a tool for teaching (Vojtek & Vojtek, 2000).

The Florida Online Reading Professional Development Program (FOR-PD), developed by the University of Central Florida funded by the state, provides an opportunity for educators to improve teaching methods in PreK-12 reading.
instruction via an online professional development course (Kleiman, 2004). Since FOR-PD was first offered in January 2003, more than 6700 Florida teachers have enrolled in the course (Kleiman, 2004). The course is offered at no cost to Florida teachers. Web-based professional development yields a 50% reduction in training time in comparison to classroom training (Kinnamon, 2000). The Center for Excellence in Distance Learning reported that utilizing technology as an educational tool had a positive impact on learning effectiveness (Killion, 2000).

For employers, the availability of online courses can considerably reduce the expense of training, particularly if the organization has isolated locations. Furthermore reducing training expenses means less time spent away from the workplace, lower management costs result, and productivity is amplified (Appana, 2008). Rigorous schedules, professional commitments, and family obligations afford inadequate time to engage in quality pedagogical study. Many staff development programs are instituting online deliveries. Online delivery formats allow staff to be developed, enhancing their skills.
Learning Theories

Individual learning styles have an influence on how people learn. Online distance education needs to consider learning styles when implementing courses (Mamo, Kettler & Husmann, 2005; Mupinga, Nora & yaw, 2006; Roy, 2006 & Williamson et al., 2007). Knowledge of the varying learning theories can be helpful to the instructor when teaching an online distance education course.

Androgogy

Knowles (1984) claimed that adults are self-directed and are expected to accept responsibility for their choices. The researcher’s adult learning theory of androgogy assumes that adults have a need to know why they have to learn something; need to learn experientially; consider learning as problem-solving; and best learn when a topic has direct value. According to Knowles, “androgogy describes a self-directed learning theory easily adaptable to online teaching and learning” (as cited in Cuellar, 2002, p. 6). The theory of androgogy categorizes a learner as being an “adult learner” only when the learner becomes an autonomous learner, which has not related to the specific age of the learner (Cuellar, 2002). When instructing adults, teachers need to emphasize the delivery
process and less emphasis on the content (Knowles, 1984).

The theory of andragogy in online education has customarily been associated with independent, nontraditional learners (Cuellar, 2002). Knowles's learning theory of andragogy and Moore's concept of autonomy both place emphasis on being a self-directed learner, which complements Witkin's cognitive style of field independence. An empirical study discovered that field-dependent learners are not self-directed learners, whereas, field-independent learners are autonomous (Ching, 1998). Online students must be self-motivated, organized, and task-oriented to be successful in this realm (Joy, 2007).

**Characteristics of Adults as Learners (CAL)**

Cross developed an adult learning theory model that describes Characteristics of Adults as Learners (CAL) in lifelong learning programs (Cross, 1981). Cross integrated the CAL model with other theoretical frameworks for adult learning, which include Knowles's theory of andragogy, Roger's theory of experiential learning, and lifespan psychology. Cross's CAL model includes two variables that include personal characteristics and situational characteristics. Personal characteristics consist of aging, life phases, and developmental stages. Situational characteristics include part-time learning vs. full-time
learning and voluntary vs. compulsory learning.

The purpose of CAL is to serve as a guideline when implementing adult education programs. According to Cross’s CAL model the four principles of adult learning programs should capitalize on the knowledge of participants. Second, be able to acclimatize to aging limitations of the participants. Third, have the ability to graduate to more sophisticated stages of personal development. Fourth, the adults should have variety in selections of the availability and organization of learning programs.

**Learner Autonomy**

Learner autonomy is the characteristic of self-direction, which is the student’s ability to determine his or her own personal objectives, activities, and assessments (Moore, 1991). In 2000, a report by Albrecht and Sack divulged that students would prefer instructors to allocate creative assignments, involving technology and the Internet, instead of relying on lectures (Basile et al., 2002). The idea here is that students can take control of their learning and become responsible, self-motivated learners.

**Social Learning Theory**

Bandura developed a social learning theory that emphasizes learning by observing and modeling behaviors,
attitudes and the emotional reactions of other people. Bandura's social learning theory integrates both cognitive and behavioral frameworks of Vygotsky and Lave. The highest level of learning occurs when organizing and rehearsing the modeled behavior symbolically and then enacting it overtly. By coding modeled behavior into words or images, retention increases (Bandura, 1977). If the results of a certain behavior are desired, individuals are more likely to adopt that behavior. In addition, individuals are likely to take on a modeled behavior if the behavior is similar to their own, has a functional value and if the observer has an admired status (Bandura, 1977).

**Transactional Distance Theory**

Moore (1973) classified distance education into two variables: distance and autonomy. Evolving from this groundwork, Moore continued to develop his theory. He defined transactional distance theory, within the framework of interaction in an instructional program, as a function of dialogue, structure, and learner autonomy (Moore, 1993). Online instructors need to be cognizant not to micromanage their course by making it too structured when implementing distance education. When an online distance education course is too structured, students feel that they are limited with their decisions about assignments.
Cognitive Learning Style Theories

Field-Independence and Field Dependence (FI/FD)

Since the 1970s, cognitive learning styles have been expansively studied in an effort to discover various ways that learners recognize and cooperate with their learning environment, methods of instruction and media. Herman Witkin's cognitive style defined by field dependence and field independence as measured by the Group Embedded Figures Test is the most extensively explored. Witkin's early work emphasizes resolving conflicts utilizing visual cues, and the rod and frames test to establish a subjects' dependence on visual cues rather than gravitational cues by manipulating a rod to a vertical position within a tilted square frame (Witkin et al., 1977). The researcher concluded that the subjects' who rely on visual cues are considered field dependent, and subjects' who rely on body cues are more field independent (Witkin, 1962; 1979).

Furthermore, it was discovered that field-independent learners are motivated intrinsically while field-dependent learners are motivated extrinsically (Witkin, Goodenough & Cox, 1977). Further research indicated that field-independent learners are more liable to be analogical problem solvers than field-dependent learners (Antonietti & Gioletta, 1995). An empirical study discovered that varying
learning styles of field-dependent and field-independent learners influence their degrees of self-directed learning (Ching, 1998).

The development of the Group Embedded Figures Test (GEFT) assists in determining if a subject is field dependent or field independent by measuring the ability to disembed a figure within a more complex visual field. The GEFT is widely used as a reliable and valid instrument in establishing cognitive learning style. Witkin’s work proposes that field independent learners are more autonomous than field dependent learners.

**Holistic-Analytic**

According to Riding and Cheena (1991) learning styles consist of two independent dimensions: holistic-analytic and verbal-imagery. When referring to the holistic-analytic dimension, holistic view situations as a whole and analytic view situations as parts. The verbal-imagery dimension consists of two effects. The first effect is how information is characterized, either as verbal, as an image, or both. The second effect is the internal and external focus of attention. The imager type learner is more apt to be internal and passive whereas the verbalizers are likely to be external and stimulating (Riding et al., 1991). Instructional material and learning performance
relate to the holistic-analytic style of the individual. For example, secondary or college level students' learning performance is influenced by abstract or pictorial presentations of instruction and the learners' cognitive style (Riding & Sadler-Smith, 1992).

**Sensory Preference**

The sensory modality system cooperates with the environment through one of the basic senses, which consist of visual, auditory and kinesthetic (Bissell, White & Zivin, 1971). According to Dunn & Dunn (1979), approximately 20% to 30% of American students are auditory learners, about another 40% are visual learners and the remaining 30% to 40% are tactual and kinesthetic, visual and kinesthetic, or some combination. Galton, who claimed that visual imagery is uncommon among scientists and conflicting with scientists' abstract way of thinking, developed the initial concept of sensory preference in 1883. Further research indicated that males are visual thinkers and females are verbal thinkers (Smith, 1964). Conflicting research does not support gender differences in sensory preference (Antonietti & Gioletti, 1996).
Hemispheric Preference

Another contributing variable that may influence individual learner differences is hemispheric preferences (Sonnier, 1991). Students who have left-hemisphere preference are apt to be strong in analytical thought processing. Students with right-hemisphere preference are likely to be strong in visual thought processing. Hemispheric preferences may influence the cognition and achievement of students. According to Gadzella (1995), students with left-hemisphere preference are prone to achieve higher grades. Although it is important to consider hemispheric preference when teaching a course instructors should utilize multiple methods to reach every learning style.

Kolb's Learning Style Model

According to Kolb’s Learning Style Inventory, there are four learning modes, which include active experimentation (AE), reflective observation (RO), concrete experience (CE), and abstract conceptualization (AC) (Kolb, 1984). Based on these four learning modes derived four learning styles that consist of converger, diverger, assimilator, and accommodator. These four learning styles are constant at various behavior levels or personality types. The converger learning style represents AE and AC;
the diverger learning style represents CE and RO; the assimilator learning style represents AC and RO; and the accommodator learning style represents AE and CE (Kolb, 1984).

**Learning Styles in a Web-Based Learning Environment**

An empirical study investigated the need for supporting different learning styles in an online learning environment at a southeastern Florida private university. Based on literature reviews Terrell (2005) discovered that most research involving attrition is conducted by semester or course not longitudinally. The subjects included 216 working professionals enrolled in a limited residency doctoral program. The subjects' completed the KOLB Learning Style Inventory as part of a methodology course.

In addition, the subjects' also provided information regarding their age, gender, and ethnicity. According to the statistical analysis, program completion was not statistically significant among males and females, minorities, age or learning style (Terrell, 2005). The results of the Haseman et al. study concur with the findings of a longitudinal study conducted by Terrell.

However, a study conducted by Ching (1998) did demonstrate significance in learner cognitive style in the discipline of distance education. The researcher utilized
the GEFT to measure an individual's ability to
differentiate perceptions. Overall, the results of this
study indicated that students became more field-independent
during the distance education program. This is an important
finding to consider, especially when developing distance
education programs in the future (Roy, 2006).

Haseman et al. (2002) examined the influences of
interactivity on user-outcomes in a multimedia environment
based on previous literature and three learning theories—
behaviorist, cognitivist, and constructivist. The results
indicated that there was no significant difference among
the three experimental groups with interactivity modes or
learning styles. Furthermore, the researchers indicated
that interactivity did not increase e-learner achievement,
however, it positively influences e-learners' attitudes.

A limitation to this study was that the different
types of learning styles tested might have yielded
different results. Mamo et al. (2005) found that a quality
distance education course, implemented correctly with
technical support could override the gaps produced by
varying teaching methods and different learning styles. E-
learning in education relies on adult learning theories
that perceive the educator as the facilitator of learning
and an assessor of outcomes in lieu of the traditional
lecturer in most face-to-face modalities (Magnussen, 2008).

Both Haseman et al. and Terrell’s studies indicate that there is a need for additional research regarding learning styles and distance education. Ching’s study suggested that cognitive style as measured by field independence could increase throughout the course of a distance education program. This implies that a distance education learner has the ability to adapt to the web-based learning environment and become more self-directed and autonomous. However, the effective delivery of online distance education may influence this.

**Online Course Satisfaction**

Students are likely to withdraw from online education courses due to the insufficient contact that they may be experiencing. The lack of traditional face-to-face contact that most students are accustomed to makes the students feel that there is not enough interaction or feedback from the online facilitator (Bird, 2007; Dennen, Darabi & Smith, 2007 & Kartha, 2006). Typically, educators in a traditional setting use their students’ body language as a tool to check for comprehension as well (Smith, 2000). If a student is staring at the teacher with a blank face, the teacher will acknowledge that the student probably is confused about the material. With the lack of meeting at a campus
like most traditional classes, it may be difficult for the student to be able to self evaluate.

This type of isolation may defeat the purpose of a "real" education experience and networking with other students, making new connections with new teachers and future co-workers (Kartha, 2006). A contrasting result of a similar study by Skillsoft, found that self-driven learning was the favored learning method for e-learning (Learners prefer to be alone, 2007).

Another study compared the differences in student attitude towards computer-mediated instruction using course management software and students only exposed to traditional classroom environments (Basile et al., 2002). The results revealed that there was not a significant difference among the groups involved as far as their attitudes regarding the students in the course with computer-mediated instruction and the course with students with traditional instruction. Course management software such as WebCT, Blackboard and Moodle, enables students to easily access their online course at anytime and serves as an organizational tool for course information (Naqvi, 2006). A study by Siritongthaworn and Kairit (2006) found that e-learner satisfaction has four dimensions that include, the delivery method, communication, technology
support, and course content.

Leaving the student to set his or her own schedule is a crucial success factor for the distance-learning student (Galusha, 2000). The student is supposed to be in control of their learning and the professor becomes the facilitator (Lee et al., 2007 & Martens et al., 2007). An issue of concern is that the student receives prompt feedback to any discussion question or assignment. This deficit of contact is a very significant one because students' ideas and learning process often results from discussions and questions posed by their peers. This does not apply to the distance learner, unless they are participating in a virtual classroom where everybody has to meet at a designated time. Therefore, the online student appreciates a timely response to any question.

The relationship between satisfaction and performance of the e-learner is related motivation and interaction. The online facilitator must maintain frequent communication, have a regular presence in the course, and set understandable expectations to the students (Dennen et al., 2007). Communication is a key component in a successful online distance education course. Integrating stories into the classroom discussions gives a more personal touch to the not-so-personal virtual classroom.
The online climate may be isolated at times, but by creating a relaxed environment to share these personal stories, the students will become more comfortable (Muirhead, 2002). These personal stories may generate other ideas and trigger discussions and participation in the distance course. When teachers share their stories of how they have done an assignment, the students can be at ease when reviewing the steps the teachers took, as well as realizing that the teachers understand the academic pressures of students (Ollerenshaw & Lowery, 2006).

Like many online schools, Florida Virtual School experienced a high drop out rate in its first few years. However, Julie Young, the executive director of FLVS, made it a point to have “relationship-building” by requiring teachers to email students, and maintain an open line of communication (Wildavsky, 2001). Once the online learners realize that their accomplishments are noteworthy, they will strive to participate in the online discussions (Durrington, Berryhill & Swafford, 2006 & Collison et al., 2000). Teachers have to build a rapport with their students and always be available to conference.

Another important aspect of distance learning is that the facilitator gives positive affirmations to the students’ work (Collison et al., 2000). By doing this, the
facilitator is promoting online participation among the students in the course. The best way to respond to students’ work is by focusing on positive comments and being sincere to each student. Since teachers became more available to conference with students at FLVS, the school currently only has a 2% drop out rate (DeNardo, 2003). With advancements like this, there will be even greater, more efficient online schools in the near future.

Interactivity positively influences e-learners’ attitudes (Mupinga et al., 2006 & Siritongthaworn et al., 2006. The distance education student’s attitude has changed towards a desire for a more traditional classroom experience, which is attainable through Web-based instruction (Lee et al., 2007; Martens, Bastiaens & Kirschner, 2007 & Naqvi, 2006). These findings provide indicators for further research on the role of the instructor when implementing pedagogy.

Guidelines for Designing Distance Education

Rumble’s Modes of Distance Education

When implementing any type of system of education there must be organization involved. Usually, the organization of the distance learning system takes on the same philosophy as the institution from which it originates. There are three different modes of operation in
distance education. These modes are sole responsibility, mixed mode, and consortium.

An example of a sole responsibility operation would be that of the Open University located in the United Kingdom (Rumble, 1986). The sole purpose of this institution and the administration is distance education. The benefit to this operation is that the primary purpose is distance education. Therefore, those involved with the institution can solely focus on distance education and not traditional education concerns. The development of new teaching practices using the technology are practiced and researched.

The mixed mode institutions are involved with both the traditional methods and distance education methods (Rumble, 1986). Most American universities are of this type of operation. Every college within the university has its own department, therefore, its own administration of the distance learning courses. There may be a specific department dedicated to the sole purpose of distance education. There are advantages for this mode of operation. For instance, the mixed approach has the ability to draw upon more resources available in the education field, like the faculty and the services of the institution (Rumble, 1986). However, the weakness is that there may be a
negative opinion from the faculty about distance education (Rumble, 1986). They may believe that distance education is a threat to their positions and is a lesser form of education and not as important as on-campus instruction.

The consortium mode of operation offered by Rumble (1986) is a group of institutions or distance education programs devoted to distance education as a means of broadening or sharing distance education programming. The opportunity available with this operation is that students are eligible to transfer credits within the institution that has centrally developed learning materials available for use. This would be very convenient for the students to be able to take courses offered at different times through different institutions to meet their personal scheduling needs.

**ADDIE Instructional Design Model**

When implementing an online course there are three basic models of instructional design involved the cognitive model, the instructional design model, and the constructivist model. Among the instructional development models, most models follow similar categories of design, development, evaluation and revision (Carey, 1990). The ADDIE instructional design model is an acronym for Analysis, Design, Development, Implementation, and
Evaluation.

The analysis phase of the ADDIE model represents the definition of the needs and limitations of the program. The design phase identifies the learning objectives, measurement, methods and media. The next phase is development, which includes beginning the production, formative evaluation, and revising. Implementing phase puts the plan into action. Evaluation phase will assess the plan from all levels for the next implementation.

**R2D2 Model**

A new model has surfaced for designing and delivering online distance education. The R2D2 model consists of four quadrants that stand for reading, reflecting, displaying and doing. This model is a very effective tool for online learning because it reaches the needs of diverse learners. The R2D2 model serves as guidance for the online instructor to consider e-learner activities in each of the four quadrants (Bonk & Zhang, 2006).

**The 3 'C' Model**

The 3 'C' model focuses on significant features of online design building upon Fowler and Mayes (2000) works of three ingredients of online learning which include content, construction, and consolidation (Bird, 2007). The main attributes of the 3 'C' model focus on a social
constructivist approach, active learning, equitable attention to all three ingredients, and discussions. The 3 'C' model is a beneficial tool for the designing of online courses to produce a successful e-learning experience.

**Online Course Implementation**

The administrative and organizational support from the institution is necessary for the success of the distance-learning course. It is beneficial to have a separate department designated for distance education. The staff for the department should be qualified to design, maintain, and manage this type of technological program (Cuellar, 2002 & Fresen, 2007). The people of Classroom Connect at Connected University realized this problem and created staff development in technology for teachers of distance education courses (Smith, 2000). These courses are helpful, informative, and last approximately six weeks. The professors of Pepperdine University trained the cyber instructors at Connected University to provide these staff developments and review the contents of each six-week course (Smith, 2000).

Utilizing guidelines may determine an online courses' success of implementation (Bonk et al., 2006; Chen et al., 2003; Kidney, Cummings & Boehm, 2007 & Martens et al., 2007). The idea is to have an instructional design that is
recyclable and, therefore, cost-effective. Chen et al. (2003) developed five criteria for making the decision to implement a course online:

1. Communication modality;
2. Access permissibility;
3. Instruction interactivity;
4. Update regularity, and
5. Information modality (p. 50).

Examining the instructional design considerations necessary for an effective online environment is a way that online deliveries can assure quality. Students agree that online courses enhance their learning (Bird, 2007; Lee et al., 2007; Mancuso-Murphy, 2007 & Martens et al., 2007).

According to Rosenkrans, (2001) the summative committee concluded that the benefits of the online segment included:

1. Time and place flexibility;
2. Access to more resources;
3. Active participation;
4. Enhanced technical skills (p. 59).

When investigating the elements necessary for design considerations of a distance education course, it is also essential to take into account the effective implementation. Many issues that may arise can impede the successful delivery of distance education. The pilot-test results and the summative committee concluded that the following is of crucial importance when designing and implementing an online course:
1. Provide technical training to students before an online segment;
2. Establish professor/student online protocol and procedures for engaging in online dialogue;
3. Establish standards for grading online content and set expectations for students;
4. Ensure that the university's hardware and computer network can support the additional online traffic;
5. Establish online tool standards by the university to be used by faculty and student body;
6. Ensure the university has the technical resources to support an online learning environment, and
7. Develop a faculty training program for professors to implement an online segment or class (Rosenkrans, 2001, p. 60).

**Faculty Perspective**

When planning for an effective implementation of distance education, it is important to consider the perspective of the faculty. A study by Perreault, Waldman, Alexander and Zhao (2002) examined the vital concerns perceived by professors during the development and delivery of online courses, and the plans to make for improvement. The researchers recommendations based on this study were training for educators, curriculum development, technology workshops, better communication within the online course, and collaboration with curriculum designers, tutorials and training for students, and providing easy access to retrieve information and resources.

One of the greatest challenges to faculty implementing online courses is the tendency to spend too much time on
the computer responding to students. In their efforts to provide prompt feedback, which is important in the Web-based environment, faculty often find themselves spending an excessive amount of time ensuring that students receive appropriate feedback for their work (Magnussen, 2008). To avoid this unwarranted amount of time on the computer, faculty should provide a response schedule. This will help keep their workload manageable.

The major issues of concern in the Perreault et al. study were the concerns related to reliability, support, and use of technology, adapting teaching styles to the distance learning course and the encouragement of communication. Kruse (2002) proposed that receiving training in Web-based learning has many benefits including self-paced learning, interactivity, increased retention rates and reduced traveling costs. It is evident that previous researchers have findings that support the staff development of faculty that teach in a web-based environment to produce an effective online course (Cuellar, 2002 & Smith, 2000).

Before an instructor prepares to teach an online course, the instructor needs to reflect on his or her own educational philosophies (Cueller, 2002). Being cognizant of e-learners' needs and learning styles will assist the
instructor in the implementation of the course (Mupinga et al., 2006). Shifting pedagogical practice paradigms from delivering instruction to producing learning is focused on active learning and learner-centered teaching (Durrington et al., 2006; Jaffee, 2003 & Lee et al., 2007). After a review of the literature, Peled (2002) proposed that there are nine political guiding principles that traditional universities can use to implement a distance-learning course when considering faculty opposition:

1. Know the institution and address its pressing needs;
2. Align the project’s goals with the interest of senior management;
3. Pilot, pilot...more pilot;
4. Generously credit others for your work;
5. Generate excitement;
6. Build a critical mass of users quickly;
7. Firmly set the project’s boundaries;
8. Free team members from all other responsibilities;

**Student Perspective**

An empirical study was conducted on student perceptions of the effectiveness of Web-based distance education. The course quality and the quality of instruction were satisfactory to students of library and information science Web-based course; however, when a course offered the element of “real-time” interaction, it enhanced the experience (Gregory, 2003). The results of indicated that four out of the five pairs of the classes
had rated the courses with some form of synchronized learning significantly higher than those that were entirely asynchronous. This is an important finding because of the need to improve course effectiveness. The student attitude has changed towards a desire for a more traditional classroom experience, which is attainable through Web-based instruction.

Gregory’s research (2003) provides justification for further study to take into consideration the changes in student attitudes that can enhance Web-based courses by including more instructor and student interaction. The level of interactivity can increase the attractiveness of certain distance education programs. Interactivity positively influences e-learners’ attitudes (Dennen et al., 2007 & Lee, 2007). However, the results of a study by Basile et al. indicated that there was not a significant difference among the groups involved as far as their attitudes regarding the students in the course with computer-mediated instruction and the course with students with traditional instruction (2002). According to Zhang et al. (2003):

In many systems, however, multimedia content is presented in a static, passive, and unstructured manner without close association among material in various media. Learners have little flexible control
over learning content and process to meet their individual needs (p. 2).

Research conducted in online courses contributed to the development of eight recommended methods that an online facilitator could take to promote more interaction with students. Collison, Elbaum, Haavid, and Tinker (2000) propose the following methods:

1. Leading introductory, community-building activities,
2. Providing virtual step-by-step, walking the digitally challenged through the course,
3. Acknowledging the diversity of students' backgrounds,
4. Being as human as possible through a computer screen, by using graphics and humor,
5. Allowing a grace period for response discussions,
6. Maintaining adequate progress,
7. Managing posts and discussion threads,
8. Keeping a balance between e-mail and public discussion threads (p. 49).

The experimental study of Zhang et al. (2003) proposed that e-learning systems with interactive, multimedia components could enhance the performance and achievement of the e-learner based on learning content that is comparable to traditional classroom instruction. Multimedia involves a combination of many media communication technologies to deliver information in a computer-based presentation. For example, text, graphics, video, animation, and sound are methods of media communication technologies. "The basic proposition is that in order to improve learning
effectiveness, an e-learning environment should provide structural support to multimedia instructions to allow efficient random access, and should present them in a synchronized and integrated manner” (Zhang et al., 2003, p. 5). Disadvantages to e-learning identified by the researchers were the time it takes to prepare for an online course and the technical support and challenges with content management.

**Evaluating Distance Education**

When implementing an online course it is vital to encourage interactivity among the students and facilitator to enhance e-learner achievement (Collison et al., 2000; Dennen et al., 2007; Durrington et al., 2006 & Peled, 2002). However, online distance education is still in its early stages and is continually evolving as technologies advance. Recent technology innovations are the vessel for various forms of interactivity in the web-based learning environment. Due to the influx of distance education courses in institutions worldwide, it has become necessary to develop a tool to evaluate learning in interactive environments.

A framework of Web-based learning environment instruments was established and built based on the work of Tobin (1998) (Chang et al., 1999). The Web-Based Learning
Environment Inventory (WEBLEI) describes students' perceptions of a Web-based learning environment. The utilization of the WEBLEI will assist institutions in the evaluation of their Web-based learning environments. This will aid in the evolution of more improved online learning environments and the success of future of distance education.

**Student Demographic Characteristics**

Distance education plays a vital role in society catering to students wherever they live and whatever their circumstances. Providing the opportunity for educational growth and development through technology, this may have otherwise been impossible or extremely difficult to achieve (Moskal et al., 2006 & Roblyer, 2003). Distance education encompasses a wide variety of situations regarding student needs including the following: remote and isolated areas, juvenile justice or correctional facilities, students with high levels of intelligence, behavioral issues, overseas travelers, medical, physical and mental health needs, adults and students with full-time careers, young parents, and school students with extenuating circumstances (Martens et al., 2007 & Moskal et al., 2006). Distance education according to Bernard et al. (2004):

In the age of the Internet and computer-mediated
communication (CMC), there is a tendency to think of (DE) Distance Education in terms of “anywhere, anytime education.” (DE) Distance Education of this type truly fits Keegan’s 1996 definitional criteria, “the quasi-permanent separation of teacher and learner” and “the quasi-permanent absence of learning groups” (p. 386).

Online education is not for every student and not by any means replaces the traditional classroom teaching; however, it is becoming an integral part of the education system curriculum today (Mancuso-Murphy, 2007 & Martens et al., 2007). There are several benefits in taking an online education course; however, online education is not for every student. Online education offers the flexibility of working at one’s own pace, time and location (Moskal et al., 2006).

The implications of online learning encompass a myriad of situations, both intrinsic and extrinsic to the online course. An e-learner must learn to overcome these implications in order to succeed. Some students may find this process easy while others find it more difficult. This depends on whether or not the students are prepared for an online education experience.

When implementing distance education there are several issues involved. The realization that there are no “stereotypical” students is considered at this point. This is important because the program has to cater to the needs
of ALL students and not be designed for this “stereotypical” student (Lee, 2007; Mamo et al., 2005; Mancuso-Murphy, 2007 & Mupinga et al., 2006). It is important to recognize the unique needs of all students.

A theoretical study conducted by Meyen et al. (2002) discovered that there is a relationship between e-learner attributes and e-learning instructional designs, when examining pedagogical effectiveness. The e-learner attributes reviewed in this study were: “age, gender, area of origin (where they are from), ethnicity, race, learning styles, first language, socioeconomic status, intellectual ability, previous educational experience, as well as learning challenges associated with disability” (Meyen et al., 2002, p. 43). The performance of e-learners may be directly affected by these attributes.

Understanding the e-learner, more specifically, gender and learner diversity will assist institutions in marketing their distance education programs (Lee, 2007). In addition to gender, the effect of native language and technological ability of the e-learner may affect students’ satisfaction with distance education (Barakzai & Fraser, 2005). However, a recent study found that age, ethnicity, gender and work experience had no influence on academic performance (Sulaiman & Mohezar, 2006).
The goal is to develop a systematic approach in researching the technical and pedagogical factors that have an effective influence on e-learning environments for every learner, even those with disabilities (Lee, 2007; Meyen et al., 2002). The key focus of online learning is to provide students with the opportunity for education regardless of their personal circumstances (Martens et al., 2007).

Accessibility is vital to students in a distance education setting. Distance education allows for the mobility of the student population. Students can travel and use the Internet to access their courses so they never have to miss classes. The training and staff credentials must reflect the diversity of the students and the complexity of the online course offerings (Mupinga et al., 2007 & Roblyer, 2003, 2006). The design of online courses must be conducive to student achievement with comparable outcomes (Bonk et al., 2006 & Lee, 2007).

Supporting the needs and demands of e-learners is vital to the retention of students. The previous paradigm of traditional classroom is shifting from instructor-centric to student-centric with the introduction of e-learning (Jaffee, 2003 & Lee et al., 2007). Online distance education may be able to “offer support to different types of learners and in each case offer suitable levels of
learner control, feedback, reinforcement, flexibility, experimentation, range of choices, and practice, all of which can enhance learner attitude and learning performance" (Haseeman et al., 2002, p. 33).

Participation in e-learning courses is affected by technology deficiencies of students (Bird, 2007 & Packham et al., 2004). The usability of the online course is an important factor to e-learners. When an online course is not easily navigable, students often give up without the proper technological support (Galusha, 1997 & Siritingthaworn et al., 2006). This occurs because the distance learner may require the immediate response on a particular task. The student is limited because they do not have the luxury of going down to study hall to see a tutor. They are solely relying upon the other members of the e-learning course to assist them. The lack of technological support may impede the progress of their learning and therefore is an obstacle.

**Theoretical Framework**

The theoretical framework for the purposes of this study was based on the discussion and review of literature and findings of the researchers. The major studies reviewed served as a guide for this study integrate cognitive learning style (Bandura, 1977; Cross, 1981; Knowles, 1984;
Kolb, 1984; Witkin et al., 1977; & Witkin 1962, 1979); study findings related to online course satisfaction (Chang et al., 1999; Chen et al., 2003; Gregory, 2003; Kartha, 2006; Lee et al., 2007; Perreault et al., 2002; Roblyer, 2003 & Rosenkrans, 2001) and student demographic characteristics (Mancuso-Murphy, 2007; Meyen et al., 2002; Packham et al., 2004 & Roblyer, 2003, 2006 & Sulaiman et al., 2006). The theories reviewed for cognitive style, online course satisfaction, and student demographics are supported by empirical research, from which the instruments utilized in this research study are derived.

**Synopsis of Literature Review**

The purpose of this review was to critically analyze theoretical and empirical literature on the impact of e-learner cognitive style on the predictive value of student success in online distance education courses and any relationships with student demographic characteristics, and to identify areas of future scholarly inquiry. Instructors' perceptions of the effectiveness of online instructional design as far as feasibility include many qualities including course implementation, time, usefulness, practicality, resources required and expertise available (Cuellar, 2002; Perreault et al., 2002; Rosenkrans, 2001 & Smith, 2000).
Throughout the discussion of literature, the evolution of distance education has been changing the way that students are educated. With the introduction of new technologies and the accessibility of distance education programs at higher education institutions, the K-12 sector, and business sector, many students have enrolled in web-based courses to enhance their education or career. Due to the growth spurt of distance education and anticipated future growth distance education has to examine how cognitive style and student demographic characteristics can influence online course satisfaction.

The problem area of students' cognitive learning styles and online course satisfaction needed to be studied due to the growing needs of lifelong learners (Kartha, 2006; Ching, 1998 & Williamson et al., 2007). "The Internet and its applications in education and industry have significantly influenced how we teach and learn" (Meyen et al., 2002, p. 37). With the growing population of e-learners and distance education programs, it has become necessary to develop an evaluative tool to assess the web-based learning environment (Chang et al., 1999). The topic area of students' cognitive learning styles and online course satisfaction was identified because of the need to evaluate the techniques used to develop and deliver
effective online instruction.

The online instructional design can be enhanced based on the perceptions of students and instructors (Gregory, 2003 & Peled, 2002). The online Instructional design of web-based courses may increase student attitudes and learning gains by considering learning style, and student demographic characteristics. By considering this data the course retention rates may increase and the overall quality of online distance education may enhance (Kruse, 2002; Meyen et al., 2002 & Terrell, 2005).

The topic of the impact of e-learner cognitive style on the predictive value of student success in online distance education courses has been thoroughly researched, however, there was limited data due to the infancy of online distance education and instructional design for distance education. In addition, there was limited research in the area of student demographics. Primarily the research focuses on age and gender. The research reviewed indicated that student demographic characteristics may influence an e-learners' online course experience (Barakzai et al., 2005; Haseman et al., 2002; Lee, 2007; Meyen et al., 2002; Packham et al., 2004 & Roblyer, 2003). By introducing multimedia to online instructional design, courses can become more flexible and improve e-Learner performance and
engagement therefore increasing online course satisfaction (Haseman et al., 2002 & Zhang et al., 2003). It is essential that students and instructors have training and experience with online distance education in order for the course to be effective.

Educational institutions should use the above data presented to prepare and implement technology in education. Instructors should use technology as an enhancement to the course content when implementing and designing a web-based course and not neglect various learning styles and student demographics that partake in distance education. By planning and implementing online distance education courses, it is important to consider the e-learners' cognitive style (Cuellar, 2002; Ching, 1998; Moore, 1973, 1991, 1993 & Witkin et al., 1977). When these variables are considered the e-learner will most likely have an increase in online course satisfaction (Basile et al., 2002; Chang et al. 1999; Chen et al., 2003; Collison et al., 2000; Gregory, 2003; Perreault et al., 2002; Roblyer, 2003; Rosenkrans, 2001; Terrell, 2005 & Zhang et al., 2003).

After reviewing the theoretical and empirical literature there is a need for training for educators, curriculum development, and technology workshops, better online communication, more collaboration with the curriculum
designers, support for novice e-learners, and designing courses to meet the needs of ALL learners and varying cognitive styles to increase online course satisfaction.

Research Questions

Based on the previous hypotheses, the following research questions were developed:

1. Which student demographic characteristics have a predictive value on cognitive learning styles?
2. Does cognitive learning style have a predictive value on online course satisfaction?
3. Which student demographic characteristics have a predictive value on online course satisfaction?
CHAPTER III

RESEARCH METHODOLOGY

This chapter presents the methods of data collection and analysis. This study sought to determine whether learners' cognitive styles influence their online course satisfaction. In addition to determining which type of cognitive learning style (field-dependent or field-independent) had more success in terms of online course satisfaction, the study sought to determine any relationships that existed between student demographic characteristics, cognitive style, and online course satisfaction.

The research questions, at the end of chapter one, derive from gaps in the literature review. This chapter begins with a summary of the research design and includes the population and sampling plan, instruments, procedures, and data collection methods, evaluation of ethical aspects of the study, methods of data analysis, an evaluation of the research methods used in this study, and summary.

Purpose of the Study

The purpose of this causal-comparative study was to determine whether learners' cognitive styles, as measured by the Group Embedded Figures Test (GEFT) (Witkin, Oltman, Raskin, & Karp, 1971), influence their online course
satisfaction as measured by the Web-Based Learning Environment Instrument (WEBLEI) (Chang & Fischer, 1999), and the possible relationships with student demographic characteristics, as measured by a researcher-developed checklist. The ultimate goal of this study was to determine which cognitive learning style has more online course satisfaction, and the relationships of student demographic characteristics that may have influenced online course satisfaction.

**Hypotheses**

This study investigated whether learners' cognitive styles had a predictive value on learners' online course satisfaction. In addition, this project explored the possible predictive values with student demographic characteristics. Consequently, the researcher hypothesized the following:

1. Student demographic characteristics (first language, age, gender, number of hours working per week, race, marital status, familial status, degree level, technological ability) will not have a predictive value of cognitive learning style (field-dependent/field-independent). (α < .05)

2. Cognitive learning styles will not influence online course satisfaction (students' perceptions of an
3. Student demographic characteristics will not predict online course satisfaction. (α< .05)

Research Questions

Based on the previous hypotheses, the researcher developed the following research questions:

1. Which student demographic characteristics have a predictive value on cognitive learning style?
2. Does cognitive learning style have a predictive value on online course satisfaction?
3. Which student demographic characteristics have a predictive value on online course satisfaction?

Research Design

This study used a causal-comparative quantitative research design, which employed a rod and frames test instrument, a survey instrument containing Likert scale questions, and a checklist developed by the researcher. The dependent variables are online course satisfaction, measured by WEBLEI, and student demographic characteristics. The independent variable is cognitive learning style measured by GEFT, to determine field dependence or field independence.
Dependent Variables

The dependent variables in this study defined by the researcher are the following:
Online Course Satisfaction: Students' perception of a Web-based learning environment based on convenient, efficiency, autonomy, enjoyment, confidence, accomplishments, success, frustration; flexibility, reflection, quality, interaction, feedback, and collaboration (Chang & Fisher, 1999). This is reported as a continuous variable.
Student Demographic Characteristics: (first language (dichotomous), age (continuous), gender (dichotomous), number of hours working per week (continuous), race (continuous), marital status (continuous), familial status (continuous), degree level (continuous), technological ability (continuous).

Independent Variables

The independent variables in this study defined by the researcher are the following:
Cognitive Learning Style: As determined by field-dependence and field-independence by the participants' score on the Group Embedded Figures Test (Witkin, Oltman, Raskin & Karp, 1971). Field-dependent learners are not self-directed learners, whereas, field-independent learners are autonomous (Ching, 1998). The analysis of scores will use
continuous variables not a discrete measure as either field-dependent or field-independent. The possible scores range from 0 to 18 on the Group Embedded Figures Test.

**Descriptive Statistics**

The descriptive statistics in the study are defined as the following:

**Student Demographic Characteristics:** In terms of this analysis will include: first language (dichotomous), age (continuous), gender (dichotomous), number of hours working per week (continuous), race (continuous), marital status (continuous), familial status (continuous), degree level (continuous), and technological ability (continuous).

Meyen, et al., 2002 defines student demographic characteristics as:

Basic characteristics including age, gender, disability, area of origin and residence, ethnicity, race, first language, learner’s ability, subject matter experience, learner’s perception, and educational history (p. 41).

**Target Population**

The target population consisted of adult learners who had participated in online distance education programs for the purposes of professional development at a Southeast Florida public school district. The target population selection for this study was on a voluntary basis with
permission from the Southeast Florida public school district.

**Accessible Population**

The accessible population included adult learners who responded to the publicized online research study from a Southeast Florida public school district. These adult learners participated in professional development through online distance education courses via Breeze Presenter, a Flash-based e-learning software tool that utilizes PowerPoint, and Blackboard, an online course management software system.

According to Green, support for a rule-of-thumb that \( N \geq 50 + 8m \) for the multiple correlation is used in research for sample size (1991). However, the sample size was 83 participants who have participated in leadership development courses for the purposes of professional development in the above-described modalities. The sample size was higher than the rule-of-thumb formula in this study because the larger the sample the more significant the study. The participants were able to read, write, and speak English. The education levels of the participants varied from a four-year degree to a doctorate degree.
Sampling Plan

A two-step, non-probability sampling plan was used to obtain the sample for the purposes of this study. The researcher obtained permission from the Director of Professional Development, at a Southeast Florida public school district. Next, the researcher obtained permission from the participants to partake in the research study. This study had a convenient sample. The participants have participated in online distance education courses for the purposes of professional development.

Instruments

Student Demographic Characteristics Checklist

For the purposes of data analysis, the researcher created a checklist instrument to measure student demographic characteristics. This checklist is comprised of a series of questions pertaining to first language, age, gender, number of hours working per week, race, marital status, familial status, college degree level, and technological ability. This instrument is as reliable and valid as the self-reporting participant is in responding to the items.
Group Embedded Figures Test (GEFT)

The researcher used the Group Embedded Figures Test, (GEFT) developed by (Witkin et al., 1971) to measure the variable of cognitive learning styles. This instrument measures field independence and field dependence using the GEFT. The instrument uses visual cues to resolve conflicts, such as the rod and frame test that determines a subject's reliance on visual cues as opposed to gravitational cues in adjusting a rod to the vertical position within a tilted square frame. Subjects relying on visual cues are field-dependent (FD); those subjects relying on body cues are field-independent (FI). GEFT determines whether a subject is FI or FD by his or her ability to dissemble a figure from a more complex visual field.

The GEFT instrument is comprised of three sections consisting of 18 items. This non-parametric test takes approximately 20 minutes to complete. Reliability is determined by comparing parallel forms. The Spearman-Brown prophecy formula computed and corrected correlations among the nine-item first section and the nine-item second section with a reliability rate of .82 for males and females. Validity is determined by finding the correlation to its parent-test (Embedded Figures Test). The correlations showed the two tests reported as -.82 for male
undergraduates and -0.63 for female undergrads. The Tyron's variance coefficients range from .89 to .95.

**Web-Based Learning Environment Instrument (WEBLEI)**

The researcher used the Web-Based Learning Environment Instrument, (WEBLEI) developed by (Chang & Fisher, 1999) to measure the variable of online course satisfaction. This instrument measures students' perceptions across four scales: access, interaction, response, and results. The WEBLEI instrument is comprised of 30 questions utilizing a five-point Likert scale. The Likert scale ratings include the following: (1) never, (2) seldom, (3) sometimes, (4) often, and (5) always. This instrument is determined to be a reliable instrument in a Web-based environment. The Cronbach Alpha reliability coefficients ranged from 0.76 to 0.86. Nunnally (1967) stated that a reliability score of 0.60 of greater is acceptable. The validity was determined in a tertiary environment. The discriminant validity shows mean correlation coefficients from 0.31 to 0.66 (Chang & Fisher, 1999).

**Procedures: Ethical Considerations and Data Collection Methods**

To ensure ethical considerations and data collection methods the following procedures took place:
1. Obtained permission to use the instruments from Mind Garden (GEFT) and Chang & Fisher (WEBLEI) selected in this study before collecting data;
2. Obtained approval from Director of Professional Development at a Southeast Florida public school district;
3. Obtained approval from the Institutional Review Board of Lynn University;
4. Contacted the selected participants via a link publicized via the online distance education programs, Breeze Presenter and Blackboard through a Southeast Florida public school district and Professional Development website. The link redirected the participants to a website that requested their participation in the research study and approved consent form;
5. Data collection took place over six weeks. Each participant completed the research surveys voluntarily. The participants selected from several survey administration dates and locations publicized on the Professional Development website to participate in the research;
6. For matching purposes, and to ensure confidentiality, each survey was coded with a
number to identify the participant beginning with 1, instead of names, on all instruments;

7. The researcher used the GEFT to determine the cognitive style (field-dependent/field-independent);

8. The student demographic characteristics checklist was given to gather background information on the participants;

9. The WEBLEI was given to determine their online course satisfaction; and

10. Notified the IRB at the conclusion of the study to report "Termination of Project."

**Methods of Data Analysis**

Upon administration and completion of the data-gathering instruments, the researcher collected the data and entered it into the Statistical Package for the Social Sciences (SPSS) Version 11.0, a computer program for statistical analyses. Finally, the researcher performed a frequency distribution to check for coding errors. Data will be stored for a period of five years, in a secure, locked depository box, and then destroyed. Reliability estimates were determined using Cronbach's Alpha and Spearman-Brown prophecy formulas. Multiple regression and a
MANOVA establish criterion-related validity. Descriptive statistics summarize the characteristics of the sample. Prior to conducting data analysis, the researcher evenly distributed the amount of participants who are field independent and field dependent by randomly selecting participants from each cognitive style type indicator.

Descriptive and inferential statistics answered the research questions. To explore the contribution of the independent variable of cognitive learning styles (field-independent or field-dependent) and other intervening and mediating variables or dependent variables, including student demographic characteristics and online course satisfaction, the researcher used Multiple Regression for data analysis.

For question one, "Which student demographic characteristics have a predictive value on cognitive learning styles?" the researcher used a Multiple Regression Model for data analysis. This compared the differences in student demographic characteristics (first language, age, gender, number of hours working per week, race, marital status, familial status, and number of years between courses, technology ability) and cognitive learning style (field-dependent or field-independent).
For question two, "Does cognitive learning style have a predictive value of online course satisfaction?" the researcher used a Multiple Analysis of Variance (MANOVA) for data analysis. This compared cognitive learning style and online course satisfaction. To determine the predictive values of GEFT, which measures cognitive learning styles, and WEBLEI, which measure online course satisfaction, the researcher used a MANOVA for data analysis. To determine if a correlation exists between learners' cognitive styles and online course satisfaction, the researcher used a MANOVA for the GEFT and WEBLEI scores. The GEFT, WEBLEI and student demographic characteristics checklist signify the descriptive statistics.

For question three, "Which student demographic characteristics have a predictive value of online course satisfaction?" the researcher used a Multiple Regression Model for data analysis. This compared differences in student demographic characteristics and online course satisfaction. To explain the predictive value of student demographic characteristics on online course satisfaction, the researcher used a Multiple Regression Model for data analysis.
External Validity

External validity is the extent to which the result of the study can generalize beyond the sample (Gall, Borg & Gall, 1996). The participants were employees at the Southeast Florida public school district. They had an educational level that varied from a four-year degree to a doctorate degree. In addition, they had participated in professional development via the online distance education modalities included in this research study.

The administration of the data-gathering instruments in this study was in person with paper and pencil. This paper and pencil method ensured that each participant had the capability to respond without having to use technology, which may have skewed the results. There was no pretest–treatment interaction because there was no pretest involved in this study that would have an influence on a posttest. There was no multiple treatment interference because the participants did not receive any treatments; therefore, there was no treatment diffusion.

There were limited experimenter effects because the researcher created the student demographic characteristics checklist; however, this researcher did not create the GEFT
and WEBLEI. There may have been reactive effects in how the participants responded to the instruments.

**Internal Validity**

Internal validity is the extent to which the independent variable produced the observed effect. The instrumentation did not change before, during, or after the study is in progress. There were no unforeseen events to arise between a pretest and posttest, affecting the variable because a pretest did not exist (history). The participants did not mature (maturation).

The GEFT and WEBLEI are reliable instruments that allow for strength of internal validity. There was no differential selection of participants because there were no control and experimental groups. All participants in this study were aspiring administrators or were already at the administrative level. Therefore, the research results are specific to the target population. The sample size was large enough to conduct statistical analysis. The data collection was administered in pencil and paper in lieu of an online data collection to avoid any bias towards technological ability of the participants.
Threats to Validity

A major threat to validity was within the convenient sample. The self-selected participants may have posed a potential selection bias. In addition, the participants may have different responses to the WEBLEI based on their technological abilities. The results of the GEFT and WEBLEI, utilized in this study, assumed that the participants answered the questions to the best of their abilities. The confounding variables were the student demographic characteristics because they may have adversely affected the results of this study.

Summary

This causal-comparative quantitative research study sought to determine whether learners' cognitive styles had a predictive value on their online course satisfaction, as well as the possible predictive values of student demographic characteristics. The research design allowed the researcher to assess and compare all of the data collected from the instruments. The analysis of the GEFT, WEBLEI, and student demographic characteristics checklist determined any relationships among predictive values.
CHAPTER IV

RESULTS

This study included 83 participants and investigated the impact of students' cognitive learning style in a web-based distance education experience and online course satisfaction. Data pertaining to the study was collected and analyzed as described in the previous chapter using SPSS version 11.0. Descriptive statistics were reported for the GEFT, WEBLEI, and Student Demographic Characteristics Checklist. Frequency distributions were computed on all variables, no missing data was revealed, and all figures were coded properly.

To assess reliabilities, Cronbach's Alpha Coefficients were calculated on the WEBLEI and GEFT (Table 1). Results from the WEBLEI were categorized into four scales: access, interaction, response, and results. As reflected in Table 1, both WEBLEI and GEFT scored within the acceptable range. Cronbach's Alpha measures how well a set of variables can measure a single undimensional latent construct. When the data has a multidimensional structure, the scores will typically be low. However, Cronbach's Alpha is not a statistical test; it is a coefficient of reliability.
### Cronbach Alpha Reliability Coefficients for WEBLEI and GEFT

<table>
<thead>
<tr>
<th>WEBLEI Scales</th>
<th>Number of Items</th>
<th>Coefficient Alphas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
<td>8</td>
<td>.75</td>
</tr>
<tr>
<td>Interaction</td>
<td>8</td>
<td>.88</td>
</tr>
<tr>
<td>Response</td>
<td>8</td>
<td>.90</td>
</tr>
<tr>
<td>Results</td>
<td>8</td>
<td>.94</td>
</tr>
<tr>
<td><strong>GEFT</strong></td>
<td><strong>18</strong></td>
<td><strong>.82</strong></td>
</tr>
</tbody>
</table>

Using a 5 point Likert scale, 1=never, 2=seldom, 3=sometimes, 4=often, 5=always, the WEBLEI is comprised of a 32-ite, rating scale designed to evaluate students’ perceptions in a web-based learning environment across four scales: access, interaction, response, and results. The initial step in effectively utilizing a web-based learning environment requires that learners successfully access the Internet. As a result, the access scales determines the degree to which the variables are related with accessing the Internet meets the students expectations. The interaction scale evaluates the extent to which students interact constructively with their peers and instructors. Consequently, the response scales gives an idea of how students felt about using web-based learning environments.

Finally, the results scale provides an indication of whether students achieved any of the learning objectives by using the resources obtained in the online environment.
The logic of the design of the WEBLEI recommends that if students did not have positive perceptions of the access, interaction, and response scales, then this was most likely to influence the results scale.

The researcher derived the means, standard deviations and variances for the WEBLEI (Table 2). These scores were categorized for field-independent and field-dependent cognitive learning styles. Before considering further inquiry, as expected, the researcher initially observed that the level of online course satisfaction was higher among participants with field-independent learning styles.

Table 2

Mean Test Scores, Standard Deviations, and P-Values of WEBLEI between FI/FD

<table>
<thead>
<tr>
<th>Scale</th>
<th>Field-Independent (FI) $n=42$</th>
<th>Field-Dependent (FD) $n=41$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
<td>M 4.070, SD .407, P .001</td>
<td>M 3.800, SD .715, P .001</td>
</tr>
<tr>
<td>Interaction</td>
<td>M 3.900, SD .532, P .001</td>
<td>M 3.100, SD 1.040, P .001</td>
</tr>
<tr>
<td>Response</td>
<td>M 3.980, SD .348, P .001</td>
<td>M 3.000, SD 1.000, P .001</td>
</tr>
<tr>
<td>Results</td>
<td>M 4.140, SD .417, P .001</td>
<td>M 3.320, SD 1.190, P .001</td>
</tr>
</tbody>
</table>
The GEFT consists of tracing figures within a test booklet. The participants were given two minutes for the first section to complete seven problems. The next two sections take five minutes each to respond to 18 questions. The GEFT score has a range of 0 to 18 (Goodstein, 1978). Upon completion of the GEFT, participants' individual scores were categorized by either field independent or field dependent learning styles. For purposes of this study, the division between field independent/dependent was set at a score of 12, as recommended by Witkin et. al., (1971).

Students scoring 12 or above on the GEFT were classified as field independent, as they more easily completed the task of finding the "hidden" figures. Students scoring 11 or below were classified as field dependent, as they could less easily disembed the "hidden" figure from the surrounding pattern. The dichotomized process resulted in 42 of the students as field independent and 41 as field dependent. Of the field independent learning styles, 21 were female and 21 were male. Of the field dependent learning styles, 22 were female and 19 were male. The average GEFT score in this study was 10.82.
Descriptive statistics for student demographic characteristics compared with cognitive learning styles (field-independent and field dependent) were performed. The majority of participants (n=48) reported English as their native language. The majority of field-independent learners (n=15) were in the 31-40 age range, and the majority of field-dependent learners (n=20) were in the 51-60 age range. Most participants (n=30) worked an average of 51-55 hours per week. Married participants (n=18) were field-independent while (n=15) were field dependent.

Both field-independent (n=31) and field-dependent (n=31) reported their ethnicity as non-Hispanic or Latino. Both field-independent (n=39) and field-dependent (n=39) reported regular use of chat/online discussion. All participants reported use of email and internet regardless of their cognitive learning style. The majority of field-independents (n=38) and field-dependents (n=35) have accessed streaming audio. Video-conferencing was not accessed by the majority of field-independents (n=30) and field-dependents (n=25). Field-independents (n=23) have not accessed other technologies, while field-dependents (n=22) reported use of other technologies.
Main Analyses

Data for this study were collected and analyzed as described in the previous chapter. Results are reported and discussed separately following a review of the research questions and the hypotheses tested.

Research Question 1: Which student demographic characteristics have a predictive value on cognitive learning styles?

Research Question 2: Does cognitive learning style have a predictive value on online course satisfaction?

Research Question 3: Which student demographic characteristics have a predictive value on online course satisfaction?

Hypotheses 1, stated that student demographic characteristics (First language, age, gender, number of hours working per week, degree level, marital status, race, ethnicity, familial status, and technology ability) will not predict cognitive learning style (Field-Dependent/Field-Independent). (α< .05)

Hypotheses 2, stated that cognitive learning style will not predict online course satisfaction (students’ perceptions of an online course). (α< .05)
Hypotheses 3, stated that student demographic characteristics will not predict online course satisfaction. \((\alpha < .05)\)

For the first research question, which investigated the differences in student demographic characteristics and cognitive learning styles a Multiple Regression Model was selected. A regression analysis is utilized to predict a continuous dependent variable from a number of independent variables. When the dependent variable is dichotomous, then logistic regression should be used. The independent variables used in regression may be classified as either continuous or dichotomous (Gall et. al., 1996). This design compared student demographic characteristics with cognitive learning styles as determined by GEFT. The results revealed that no significant differences were found as reported in Table 3.

The significance levels given for each independent variable indicates whether that particular independent variable is a significant predictor of the dependent variable, over and above the other independent variables. To analyze individual predictors, the t-statistic was considered by the researcher. As a predictor variable, no significance was found for any of the explanatory variables. While non-significant the most important
predictor variables in order were video conferencing, internet, age, race, streaming audio, chat/online, education level, other technologies, ethnicity, native language, gender, familial status, hours working per week, and marital status. Since these variables were non-significant, no conclusions were derived with regard to their relationships.

Table 3

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>SE</th>
<th>Beta</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>.444</td>
<td>-.065</td>
<td>.948</td>
<td></td>
</tr>
<tr>
<td>native language</td>
<td>.027</td>
<td>.070</td>
<td>.542</td>
<td>.590</td>
</tr>
<tr>
<td>Age</td>
<td>.078</td>
<td>.130</td>
<td>.923</td>
<td>.359</td>
</tr>
<tr>
<td>Gender</td>
<td>.123</td>
<td>.052</td>
<td>.423</td>
<td>.673</td>
</tr>
<tr>
<td>hours working per week</td>
<td>.065</td>
<td>.050</td>
<td>.381</td>
<td>.704</td>
</tr>
<tr>
<td>education level</td>
<td>.074</td>
<td>-.076</td>
<td>-.582</td>
<td>.563</td>
</tr>
<tr>
<td>marital status</td>
<td>.051</td>
<td>.035</td>
<td>.268</td>
<td>.790</td>
</tr>
<tr>
<td>Race</td>
<td>.065</td>
<td>.090</td>
<td>.715</td>
<td>.477</td>
</tr>
<tr>
<td>ethnicity</td>
<td>.151</td>
<td>.076</td>
<td>.575</td>
<td>.567</td>
</tr>
<tr>
<td>familial status</td>
<td>.036</td>
<td>.058</td>
<td>.410</td>
<td>.683</td>
</tr>
<tr>
<td>chat/online discussion</td>
<td>.131</td>
<td>-.075</td>
<td>-.596</td>
<td>.553</td>
</tr>
<tr>
<td>internet</td>
<td>.605</td>
<td>.168</td>
<td>1.275</td>
<td>.206</td>
</tr>
<tr>
<td>streaming audio</td>
<td>.203</td>
<td>.082</td>
<td>.622</td>
<td>.536</td>
</tr>
<tr>
<td>Video conferencing</td>
<td>.128</td>
<td>-.155</td>
<td>-1.279</td>
<td>.205</td>
</tr>
<tr>
<td>other technologies</td>
<td>.124</td>
<td>-.071</td>
<td>-.577</td>
<td>.566</td>
</tr>
</tbody>
</table>

For the second research question, which compared cognitive learning style and online course satisfaction, a Multivariate Analysis of Variance (MANOVA) was selected using Wilks’ lambda criteria. The cognitive styles were first analyzed jointly with a multivariate analysis of
variance. The results of the multivariate analyses of variance are provided in Table 4. The joint analyses of cognitive learning styles and the influence online course satisfaction revealed significance across WEBLEI’s four scales, access, interaction, response, and results.

Table 4
Multivariate Analyses of Variance Comparing Cognitive Learning Style (GEFT) and Online Course Satisfaction (WEBLEI)

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>Access</td>
<td>1</td>
<td>1.474</td>
<td>4.386</td>
<td>.039</td>
</tr>
<tr>
<td></td>
<td>Interaction</td>
<td>1</td>
<td>13.518</td>
<td>19.826</td>
<td>.001</td>
</tr>
<tr>
<td>Learning styles</td>
<td>Response</td>
<td>1</td>
<td>19.771</td>
<td>35.606</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Results</td>
<td>1</td>
<td>14.148</td>
<td>17.900</td>
<td>.001</td>
</tr>
</tbody>
</table>

For the third research question, which compared differences in student demographic characteristics and online course satisfaction (WEBLEI) a Multiple Regression Model was selected. A multiple regression was reported for each of the four scales of the WEBLEI separately. As shown in Table 5, the overall regression equation was non-significant using all student demographic characteristic variables in regards to the WEBLEI’s access scale (F=1.716, p=.072).

To analyze the individual predictor, the t-statistic, which is the regression coefficient, the researcher only found significance for chat/online (t=3.304, p=.002) and ethnicity (t=2.236, p=.029). As predictor variables,
chat/online expressed its beta value ($b=.380$) and ethnicity expressed its beta value ($b=.268$). While non-significant the most important predictor variables for the access scale in order were education level, hours working per week, gender, other technologies, streaming audio, age, internet, familial status, native language, video conferencing, race, and marital status. Since these variables were non-significant, no conclusions were derived with regard to their relationships.

Table 5

Multiple Regression Comparing Student Demographic Characteristics and Online Course Satisfaction (WEBLEI) Scale: Access

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>SE</th>
<th>Beta</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>.412</td>
<td>.056</td>
<td>8.249</td>
<td>.000</td>
</tr>
<tr>
<td>native language</td>
<td>.025</td>
<td>.120</td>
<td>.472</td>
<td>.639</td>
</tr>
<tr>
<td>Age</td>
<td>.072</td>
<td>-.120</td>
<td>-.933</td>
<td>.354</td>
</tr>
<tr>
<td>Gender</td>
<td>.114</td>
<td>.171</td>
<td>1.523</td>
<td>.132</td>
</tr>
<tr>
<td>hours working per week</td>
<td>.061</td>
<td>.189</td>
<td>1.568</td>
<td>.121</td>
</tr>
<tr>
<td>education level</td>
<td>.068</td>
<td>-.222</td>
<td>-1.853</td>
<td>.068</td>
</tr>
<tr>
<td>marital status</td>
<td>.047</td>
<td>.033</td>
<td>.281</td>
<td>.780</td>
</tr>
<tr>
<td>Race</td>
<td>.060</td>
<td>.048</td>
<td>.416</td>
<td>.679</td>
</tr>
<tr>
<td>ethnicity</td>
<td>.140</td>
<td>.268</td>
<td>2.236</td>
<td>.029</td>
</tr>
<tr>
<td>Familial status</td>
<td>.033</td>
<td>.088</td>
<td>.685</td>
<td>.495</td>
</tr>
<tr>
<td>chat/online discussion</td>
<td>.122</td>
<td>.380</td>
<td>3.304</td>
<td>.002</td>
</tr>
<tr>
<td>Internet</td>
<td>.561</td>
<td>.089</td>
<td>.738</td>
<td>.463</td>
</tr>
<tr>
<td>streaming audio</td>
<td>.188</td>
<td>.113</td>
<td>.936</td>
<td>.353</td>
</tr>
<tr>
<td>video conferencing</td>
<td>.118</td>
<td>-.048</td>
<td>-.432</td>
<td>.667</td>
</tr>
<tr>
<td>other technologies</td>
<td>.115</td>
<td>.154</td>
<td>1.367</td>
<td>.176</td>
</tr>
</tbody>
</table>

df=14  p>.05  $R^2=.261$  Adjusted $R^2=.109$
The researcher continued Multiple Regression analyses for student demographic characteristics and the WEBLEI interaction scale. As reflected in Table 6, the overall regression equation was significant for the WEBLEI's interaction scale using all student demographic variables ($F=2.143$, $p=.020$). To analyze the individual predictors, the t-statistic, was found significant for age ($t= -2.724$, $p=.008$), race ($t= 2.585$, $p=.012$), and education level ($t= -2.075$, $p=.042$). As predictor variables, the beta values were expressed as ($b= -.339$) for age, ($b= .287$) for race, and ($b= -.241$) for education level. Although non-significant, the most important predictor variables in order for the interaction scale were hours working per week, native language, ethnicity, video conferencing, other technologies, chat/online, internet, familial status, streaming audio, marital status, and gender. Conclusions were not drawn for these variables due to being non-significant.
Table 6

Multiple Regression Comparing Student Demographic Characteristics and Online Course Satisfaction (WEBLEI) Scale: Interaction

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>SE</th>
<th>Beta</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>.710</td>
<td></td>
<td>4.760</td>
<td>.000</td>
</tr>
<tr>
<td>native language</td>
<td>.044</td>
<td>.182</td>
<td>1.591</td>
<td>.116</td>
</tr>
<tr>
<td>Age</td>
<td>.125</td>
<td>-.339</td>
<td>-2.724</td>
<td>.008</td>
</tr>
<tr>
<td>Gender</td>
<td>.197</td>
<td>-.048</td>
<td>-.440</td>
<td>.661</td>
</tr>
<tr>
<td>hours working per week</td>
<td>.105</td>
<td>.188</td>
<td>1.609</td>
<td>.112</td>
</tr>
<tr>
<td>education level</td>
<td>.118</td>
<td>-.241</td>
<td>-2.075</td>
<td>.042</td>
</tr>
<tr>
<td>marital status</td>
<td>.081</td>
<td>.058</td>
<td>.506</td>
<td>.614</td>
</tr>
<tr>
<td>Race</td>
<td>.103</td>
<td>.287</td>
<td>2.585</td>
<td>.012</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>.242</td>
<td>.152</td>
<td>1.309</td>
<td>.195</td>
</tr>
<tr>
<td>Familial status</td>
<td>.057</td>
<td>.081</td>
<td>.650</td>
<td>.518</td>
</tr>
<tr>
<td>chat/online discussion</td>
<td>.209</td>
<td>-.089</td>
<td>-.804</td>
<td>.424</td>
</tr>
<tr>
<td>Internet</td>
<td>.967</td>
<td>.091</td>
<td>.778</td>
<td>.439</td>
</tr>
<tr>
<td>streaming audio</td>
<td>.324</td>
<td>.068</td>
<td>.579</td>
<td>.565</td>
</tr>
<tr>
<td>video conferencing</td>
<td>.204</td>
<td>-.130</td>
<td>-1.223</td>
<td>.226</td>
</tr>
<tr>
<td>other technologies</td>
<td>.197</td>
<td>.131</td>
<td>1.199</td>
<td>.235</td>
</tr>
</tbody>
</table>

\[ R^2 = .306 \quad \text{Adjusted } R^2 = .163 \]

The researcher continued Multiple Regression analyses for student demographic characteristics and the WEBLEI response scale. As reflected in Table 7, the overall regression equation was significant for the WEBLEI’s response scale using all student demographic variables \( F=2.143, \ p=.020 \). To analyze the individual predictors, the t-statistic, was found significant for age \( t= -2.620, \ p=.011 \), race \( t= 2.627, \ p=.011 \), and education level \( t= -2.294, \ p=.025 \). As predictor variables, the beta values were expressed as \( b= -.326 \) for age, \( b= .292 \) for race, and \( b= -.266 \) for education level. Although non-
significant, the most important predictor variables in order for the response scale were streaming audio, native language, chat/online, hours working per week, internet, ethnicity, familial status, other technologies, video conferencing, gender, and marital status. No conclusions were derived with regards to relationships because these variables were not significant.

Table 7

Multiple Regression Comparing Student Demographic Characteristics and Online Course Satisfaction (WEBLEI)

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>SE</th>
<th>Beta</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>.725</td>
<td></td>
<td>4.450</td>
<td>.000</td>
</tr>
<tr>
<td>native language</td>
<td>.045</td>
<td>.205</td>
<td>1.788</td>
<td>.078</td>
</tr>
<tr>
<td>Age</td>
<td>.127</td>
<td>-.326</td>
<td>-2.620</td>
<td>.011</td>
</tr>
<tr>
<td>Gender</td>
<td>.201</td>
<td>-.027</td>
<td>-.248</td>
<td>.805</td>
</tr>
<tr>
<td>hours working per week</td>
<td>.107</td>
<td>.140</td>
<td>1.197</td>
<td>.235</td>
</tr>
<tr>
<td>education level</td>
<td>.120</td>
<td>-.266</td>
<td>-2.294</td>
<td>.025</td>
</tr>
<tr>
<td>marital status</td>
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<td>-.008</td>
<td>-.066</td>
<td>.948</td>
</tr>
<tr>
<td>Race</td>
<td>.106</td>
<td>.292</td>
<td>2.627</td>
<td>.011</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>.247</td>
<td>.128</td>
<td>1.103</td>
<td>.274</td>
</tr>
<tr>
<td>Familial status</td>
<td>.058</td>
<td>.115</td>
<td>.927</td>
<td>.357</td>
</tr>
<tr>
<td>chat/online discussion</td>
<td>.214</td>
<td>.149</td>
<td>1.338</td>
<td>.185</td>
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<tr>
<td>Internet</td>
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<td>.248</td>
</tr>
<tr>
<td>streaming audio</td>
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<td>.231</td>
<td>1.983</td>
<td>.051</td>
</tr>
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<td>video conferencing</td>
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<td>-.398</td>
<td>.692</td>
</tr>
<tr>
<td>other technologies</td>
<td>.201</td>
<td>.088</td>
<td>.807</td>
<td>.422</td>
</tr>
</tbody>
</table>

\[ df=14 \quad p<.05 \quad R^2=.306 \quad \text{Adjusted } R^2= .163 \]

Finally, the researcher performed a Multiple Regression analyses for student demographic characteristics and the WEBLEI results scale. The results scale of the WEBLEI is perhaps the most significant because it reflects
students’ perceptions of what they had gained through the web-based learning experience. As shown in Table 8, the overall regression equation was significant for the WEBLEI’s results scale using all student demographic variables ($F=2.477, p=.007$). To analyze the individual predictors, the t-statistic, was found significant for race ($t=3.26, p=.002$) education level ($t= -2.764, p=.007$), age ($t= 2.450, p=.017$), and chat/online ($t= 2.266, p=.027$). As predictor variables, the beta values were expressed as ($b=.355$) for race, ($b= -.313$) for education level, ($b= -.298$) for age, and ($b=.246$) for chat/online. Although non-significant, the most important predictor variables in order for the results scale were ethnicity, hours working per week, other technologies, native language, streaming audio, internet, video conferencing, gender, and marital status. No conclusions were derived concerning relationships because these variables were not significant.
Multiple regression analysis was performed to compare the differences in student demographic characteristics and cognitive learning style. Based upon the multiple regression analysis, the null hypothesis was not rejected. There was no significant correlation discovered between the student demographics characteristics and the GEFT. A multivariate analysis of variance was then used to determine the differences among cognitive learning style and online course satisfaction. Based upon the MANOVA, the null hypothesis was rejected. A significant correlation was
found between the GEFT and the WEBLEI. Another multiple regression was performed to compare the differences in student demographic characteristics and online course satisfaction. Based upon the multiple regression analysis, the null hypothesis was rejected. A significant correlation was discovered between the student demographic characteristics and online course satisfaction. Implications of these results are further discussed in the final chapter.

Research Questions

Research Question One

For question one, a Multiple Regression Model was used to compare the differences in student demographic characteristics and cognitive learning style. This research question asked what student demographic characteristics have a predictive value on cognitive learning style. The answer to this research question is that no specific student demographic characteristics had a predictive value on the individuals' cognitive learning style.

Research Question Two

For question two, a Multiple Analysis of Variance (MANOVA) was used to compare cognitive learning style and online course satisfaction. This research question asked
does cognitive learning style have a predictive value on online course satisfaction. The answer is that cognitive learning style has a predictive value on online course satisfaction. Field-independent learners have higher online course satisfaction than field-dependent learners within this sample.

Research Question Three

For question three, a Multiple Regression Model was used to compare differences in student demographic characteristics and online course satisfaction. This research question asked which student demographic characteristics have a predictive value on online course satisfaction. The answer is that overall there were certain student demographic characteristics that had a predictive value on online course satisfaction. A participants' age, education level, and race were significant in the Interaction, Response, Results scales of the WEBLEI for online course satisfaction.

In addition, the Results scale included the student demographic characteristic of being experienced with chat/online discussion as having a predictive value on online course satisfaction. The Access scale was not significant, however, two of the student demographic characteristics presented in this scale did have a
predictive value, previous experience with chat/online discussion and the participants' ethnicity.
CHAPTER V

DISCUSSION

The purpose of this study was to determine whether learners' cognitive styles, as measured by the Group Embedded Figures Test (GEFT) (Witkin, et. al., 1971), influence their online course satisfaction as measured by the Web-Based Learning Environment Instrument (WEBLEI) (Chang & Fischer, 1999), and possible relationships with student demographic characteristics, as measured by a researcher-developed checklist.

There are two separate characteristics of cognitive learning style measured by field independence and field dependence. The student demographic characteristics include first language, age, gender, number of hours working per week, race, marital status, familial status, and college degree level. Online course satisfaction included students' perceptions across four scales: access, interaction, response, and results. The ultimate goal of this study was to determine which cognitive learning style has more online course satisfaction, and the relationships of student demographic characteristics that may influence online course satisfaction.

Research indicates that field-independent learners are motivated intrinsically while field-dependent learners are
motivated extrinsically (Witkin, et al., 1977). Therefore, a distance education course might benefit a field-independent learner more than a field-dependent learner. This is an important finding to consider, especially when developing distance education programs in the future (Roy, 2006). The principal investigator of this study supports these findings because field-independent learners were more successful than the field-dependent learners in a web-based learning environment across all scales measured on the WEBLEI.

Due to controversy there is limited research in the area of student demographics. Primarily the research focuses on age and gender. Research indicates that student demographic characteristics may influence an e-learners' online course experience (Barakzai et al., 2005; Haseman et al., 2002; Lee, 2007; Meyen et al., 2002; Packham et al., 2004 & Roblyer, 2003). Based on research gathered on student demographic characteristics, the principal investigator supports these findings. More specifically, the principal investigator found that age, education level, and race significantly influenced online course satisfaction as measured in this study.

Students are likely to withdraw from online education courses due to the insufficient contact that they may be
experiencing. The lack of traditional face-to-face contact that most students are accustomed to makes the students feel that there is not enough interaction or feedback from the online facilitator (Bird, 2007; Dennen, Darabi & Smith, 2007 & Kartha, 2006). By introducing multimedia to online instructional design, courses can become more flexible and improve e-Learner performance and engagement therefore increasing online course satisfaction (Haseman et al., 2002 & Zhang et al., 2003). According to the findings of this study, the principal investigator found that field-independent learners were more comfortable with interaction than the field-dependent learners.

Consequently, based on the results of the GEFT, WEBLEI and student demographic characteristic checklist, the principal investigator hypothesized and concluded the following: In this sample, student demographic characteristics had no influence on cognitive learning style. However, an individual’s cognitive learning style did influence online course satisfaction. As for student demographic characteristics, age, educational level, and race influenced online course satisfaction.

The researcher concluded that the results of this study suggest higher online course satisfaction is achieved for field-independent learners. The father of cognitive
learning styles, Herman Witkin, states that subjects' who rely on visual cues are considered field dependent, and subjects' who rely on body cues are more field independent (Witkin, 1962; 1979). An empirical study discovered that field-dependent learners are not self-directed learners, whereas, field-independent learners are autonomous (Ching, 1998). The principal investigator of this study's findings supports the current research on cognitive learning styles and their behaviors in a web-based learning environment.

Within this framework of perspective, distance education programs must be designed to accommodate the needs of every type of learner and not just the traditional type of student (Roblyer, 2003). The principal investigator's study findings support current research on the need to accommodate every type of learner so they can be successful in an online learning environment. By raising awareness to varying student demographics including gender and diversity institutions are able to better market their distance education programs (Lee, 2007). The principal investigator of this study supports this notion, based on findings of this study. The goal is to develop a systematic approach in researching the technical and pedagogical factors that have an effective influence on e-learning environments for all learners, even those with disabilities.
(Meyen et al., 2002). The principal investigator’s study did not account for individuals with disabilities. According to a study conducted by Terrell (2005), program completion was not statistically significant among males and females, minorities, age or learning style. The principal investigator did not address program completion in this study.

Conclusions

The results of this study add to the existing knowledge of distance education administrators, designers, researchers, and instructors. As online academia continues to expand, it becomes increasingly imperative to gain an understanding as to why some students succeed in a web-based learning environment while others do not. E-learning has been introduced as a promising solution to educational challenges by providing an opportunity for anyone to access education, anywhere, and at anytime (Moskal et al., 2006 & Zhang et al., 2003). Growing popularity of distance education compels schools to face the challenge of making their distance education program attractive.

A total of 83 subjects participated in this study. Ages of the participants ranged from (26-30) to (61 and over) age groups. Of the 83 participants, 51.8% were female and 48.2% were male. The sample population consisted of
adult participants of online professional development courses offered at a Southeastern Florida public school district. According to Green support for a rule-of-thumb that $N \geq 50 + 8m$ for the multiple correlation is used in research for sample size (1991). The sample size is higher than the rule-of-thumb formula in this study because the larger the sample the more significant the study.

Scores on the GEFT were similar to those indicated in the test manual. The findings of this study indicate that there was no correlation between age and cognitive learning style. The results of this study are consistent with previous findings that cognitive learning styles are firm measures and are not anticipated to fluctuate significantly with maturation (Witkin, 1977). The principal investigator concluded that a participants' cognitive learning style as indicated by the GEFT was a good predictor of online course satisfaction as indicated on the WEBLEI.

The principal investigator of this study discovered that participants who were more field-independent had higher online course satisfaction, being more comfortable in an online learning environment. A possible explanation to this finding is that field-independent learners tend to be knowledge seekers and are more disciplined when it comes to autonomous tasks. The results of this study indicate
that field-independent learners are inclined to be more comfortable with online technologies than their counterpart. Based on the findings of this study, the principal investigator suggests that field-dependent learners may benefit from an online course orientation and practice the necessary skills with online technologies to build proficiency preceding enrollment in an online course. In addition, institutions offering online courses may want to offer a help line for online learners to call when they are experiencing technical challenges.

Scores on the WEBLEI were analyzed for reliability and produced a Cronbach's alpha coefficient within the accepted range. An interesting finding to this study was that 75% of the participants scored a 4 (often) on the WEBLEI indicating that they had high levels of confidence in a web-based learning environment. A possible explanation for this finding is that participants of online courses are inclined to be more technologically savvy. The principal investigator discovered that field-independent learners often utilized access, interaction, response, and results scales, whereas, field-dependent learners sometimes utilized these areas of a web-based course.

The principal investigator of this study compared participants' student demographic characteristics with
online course satisfaction and significance was found among specific descriptors. Results of this study indicated that age was significantly correlated with online course satisfaction. This finding suggests that maturity may influence students' choices in terms of time management and discipline. Education level was significant as it relates to online course satisfaction. A possible explanation was that a participants' education level may have exposed them to a variety of academic settings and previous technologies that increased their abilities to fully participate and benefit in an online course, therefore, increasing their online course satisfaction. Results of the study showed that race significantly correlated with online course satisfaction. This may be due to a multitude of factors not explored by the principal investigator of this study.

The Student Demographic Characteristics Checklist captured the first language, age, gender, number of hours working per week, degree level, marital status, race, ethnicity, familial status, and technology ability of each participant. The results of the checklist were compared with cognitive learning styles to determine if there were any student demographic characteristics that could be predictors of cognitive learning styles. The findings indicated that there was no significance of student
demographic characteristics having a predictive value on cognitive learning style.

Limitations

There are few limitations regarding this study. First, as mentioned previously, the study’s sample was confined to adult learners on a voluntary basis from a Southeast Florida public school district, due to availability. All participants had previous experience with distance education courses. The results of the GEFT, WEBLEI, and student demographic checklist used in the study assumed that the adult learners responded to all questions independently, honestly, and to the best of their capabilities. The conclusions obtained within this study are limited to the population represented by the sample.

This study did not address socio-economic status or the status of the participant’s educator certification. If a participant was approaching the expiration period of their educator certificate, Florida requires either 120 inservice points or six college credits to renew their educator certificate for another five year validity period. This may have been a motivator to diligently complete the online professional development course. Furthermore, in some cases educators and administrators do not pay for these professional development courses. If participants had
to pay for the online professional development course there may have been different results.

**Recommendations for Future Research**

Future research is needed in this area because of the growing online distance education market. The effectiveness of online education can enhance student learning (Zhang et al., 2003). Unfortunately the most recent research related to distance education by the National Education Association’s Institute for Higher Education Policy (1999) identified the following weaknesses in distance education research:

1. Does not consider differences among students;
2. Does not consider different learning styles and how they relate to using specific technologies;
3. Does not include a theoretical or conceptual framework;
4. Does not sufficiently explain why the dropout rate is higher for distance learners.

In addition to these general needs in distance education research, it is important for schools to determine the success rate of students for their own admissions and enrollment purposes. The principal investigator’s findings support the identified areas of weakness in distance education.

Furthermore, student and instructor communication needs further research. Gregory’s research (2003) provides justification for further study to take into consideration
the changes in student attitudes that can enhance Web-based courses by including more instructor and student interaction. The level of interactivity can increase the attractiveness of certain distance education programs. According to the WEBLEI scale of interactivity, field-independent learners were more comfortable than field-dependent learners. This may be due to previous online course experience.

Interactivity positively influences e-learners' attitudes (Dennen et al., 2007 & Lee, 2007). However, the results of a study by Basile et al. indicated that there was not a significant difference among the groups involved as far as their attitudes regarding the students in the course with computer-mediated instruction and the course with students with traditional instruction (2002). Examining the instructional design considerations necessary for an effective online environment is one way that online deliveries can assure quality. These findings provide indicators for further research on the role of the instructor when implementing pedagogy.

Understanding the e-learner, more specifically, gender and learner diversity will assist institutions in marketing their distance education programs (Lee, 2007). The principal investigator agrees with this research because
the cognitive learning style of the participants of this study influenced their online course satisfaction. In addition to gender, the effect of native language and technological ability of the e-learner may affect students' satisfaction with distance education (Barakzai & Fraser, 2005). Furthermore, a recent study found that age, ethnicity, gender and work experience had no influence on academic performance (Sulaiman & Mohezar, 2006). The principal investigator refutes these findings because based on the results of this study there were no significant findings for these attributes, with the exception of age.

Educators across the United States and globally need to pursue professional development to enhance their individual professional development plan to ultimately increase student achievement. In lieu of taking a day off from work and hiring a substitute many school districts are seeking an alternative means for educators to obtain their professional development. Several public school districts across Florida are implementing learning management systems, such as Blackboard, for their educators and administrators to professionally grow without having to leave campus. This is not only cost effective, but process efficient. However, are these public school districts getting their return on investment? At this time there is
little research available that involves these variables within this arena. Most research on online distance education pertains to the higher education level and some virtual high school models.

There is no one answer to solve all of these issues presented. However, as online distance education continues to expand in every realm of our world further research is unstoppable. As the current trend continues, online distance education will eventually become more suitable for every type of learner.

Implications for Practice

Based on this rapid growth of distance education, by 2011 the majority of students will be participating in online courses (Distance Learning Today, Media Kit, 2007). The implications of online learning encompass a multitude of situations, both intrinsic and extrinsic to the online course. Communication is a key component in a successful online distance education course. The online facilitator must maintain frequent communication, have a regular presence in the course, and set understandable expectations to the students (Dennen et al., 2007).

Students’ cognitive learning styles and online course satisfaction needs to be studied due to the growing needs of lifelong learners (Kartha, 2006 & Williamson & Watson,
With the growing population of e-learners and distance education programs, it has become necessary to develop an evaluative tool to assess the web-based learning environment (Chang et al., 1999 & Lee, Tseng, Liu & Liu, 2007). By planning and implementing online distance education courses, it is important to consider the e-learners’ cognitive style (Cuellar, 2002; Ching, 1998; Moore, 1973, 1991, 1993 & Witkin et al., 1977). When these variables are considered the e-learner will most likely have an increase in online course satisfaction (Basile et al., 2002; Chang et al. 1999; Chen et al., 2003; Collison et al., 2000; Gregory, 2003; Perreault et al., 2002; Roblyer, 2003; Rosenkrans, 2001; Terrell, 2005 & Zhang et al., 2003).

This study re-emphasized the issues of an increased demand and implementation of online distance education. It provides information that may influence the development and design of online distance education courses. The effectiveness of online education can enhance student learning (Zhang et al., 2003). By considering this data the course retention rates may increase and the overall quality of online distance education may enhance (Kruse, 2002; Meyen et al., 2002 & Terrell, 2005).
The results suggest that cognitive learning styles influence a learner’s online course satisfaction. In addition, certain student demographic characteristics (age, education level, and race) effect online course satisfaction. By conducting needs assessments and surveying your participants, online distance education course implementation may be more effective as far as learner outcomes. If educators and administrators can be professionally developed successfully through an online learning environment then student achievement will increase.
References


Bibliography


http://www.usdla.org/html/journal/OCT02_Issue/article01.html


Retrieved 08/06/2004, from ProQuest database.


Appendix A

Permission to use Group Embedded Figures Test (GEFT)

Sales Receipt

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Thank you!

Total

$225.00

Ph (650) 322-6300 Fax (650) 322-6398
info@mindgarden.com www.mindgarden.com
Vendor Federal ID# 77 0380 345.
Appendix B

Permission to use WEBLEI

From: Darrell Fisher
To: [Redacted]
Subject: Re: WEBLEI
Date: Sun, May 28, 2006 09:38 PM
Attachment(s): 2 file(s)/document(s) | Total File Size: 365K

Dear Heather,

I have attached the WEBLEI and some other information about it.
Good luck with your studies.
Darrell Fisher

Professor Darrell Fisher
Deputy Director
Science and Mathematics Education Centre
Curtin University of Technology
GPO Box U1987
Perth
WA 6845
Australia
Tel [Redacted]

On 28/5/06 1:14 AM, [Redacted] wrote:
Hello Dr. Fisher
My name is Heather Butler and I am a Ph.D. candidate in Global Leadership at Lynn University in Florida. I was interested in your instrument, WEBLEI, for my study. How do I go about obtaining a copy? Thanks.
Sincerely,
Heather Butler
Top of Form
Appendix C

Student Demographic Characteristics Checklist

Directions: Please read each question and respond accordingly with an X in the spaces provided.

What is your first language?
☐ Chinese
☐ Spanish
☐ English
☐ Bengali
☐ Hindi/Urdu
☐ Arabic
☐ Portuguese
☐ Russian
☐ Japanese
☐ German
☐ French
☐ Creole
☐ Other

What is your age?
☐ 18-21
☐ 22-25
☐ 26-30
☐ 31-40
☐ 41-50
☐ 51-60
☐ 61 or over

What is your gender?
☐ Male
☐ Female

How many hours a week do you work?
☐ 30-40
☐ 41-45
☐ 46-50
☐ 51-55
☐ 56-60
☐ 61-65
☐ 66 or over
What is the highest level of education you have completed?

☐ 4-Year College Degree
☐ Master’s Degree
☐ Specialist Degree
☐ Doctoral Degree
☐ Professional Degree (MD, JD)

What is your current marital status?

☐ Single, Never Married
☐ Married
☐ Separated
☐ Divorced
☐ Widowed

What is your race?

☐ White
☐ White, Non-Hispanic
☐ African-American
☐ Hispanic
☐ Asian-Pacific Islander
☐ Native American
☐ Multiracial
☐ Other

What is your familial status?

(Please check all that apply.)

☐ Child/Children under 18 years of age in the household
☐ Pregnant
☐ Legal custodian/Designee of a child/children under 18 years of age in the household
☐ In the process of adopting or gaining custody of a child/children under 18 years of age

Which of the following specific technologies have you used in the past year?

(Please check all that apply.)

☐ Chat/Online discussion
☐ Email
☐ Internet
☐ Streaming audio over the Internet
☐ Video conferencing over the Internet
☐ Digital signature/id cards
☐ 3-D environments
☐ Other technologies