EXPLAINING LEARNER SATISFACTION WITH PERCEIVED KNOWLEDGE GAINED IN WEB-BASED COURSES THROUGH COURSE STRUCTURE AND LEARNER AUTONOMY

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

Graduate School of The Ohio State University

By

Jennifer Calvin, M.A.

The Ohio State University
2005

Dissertation Committee:

Professor David S. Stein, Advisor
Professor Joseph E. Heimlich
Professor Christopher J. Zirkle

Approved by:

__________________________________________
Advisor
Graduate Program in Education
ABSTRACT

Distance education in formal undergraduate and graduate programs is the fastest growing segment of adult education, and many institutions and instructors are placing learning opportunities on the World Wide Web. Yet many adult learners do not possess the skills required to successfully complete Web-based courses. Although learning at a distance has been in existence for over 100 years, there are very few pedagogical theories on learning at a distance. The purpose of this study was to propose a conceptual model of learning in Web courses and to test this model in a specific setting: a large Midwestern university offering courses taught via the Web. The model suggested that computer technology would mediate learner autonomy, that learner autonomy would effect the required level of course structure, and that there would be a linear relationship between learner autonomy and course structure to explain a significant portion of the variance in satisfaction with perceived learning in the fourteen Web courses included in the study.

240 randomly sampled students were asked to complete the questionnaires. A total of 68 (28%) usable responses were completed online. The Learner Profile questionnaire included a previously developed scale (Motivated Strategies for Learning Questionnaire, Pintrich, Smith, Garcia & McKeachie, 1991), and a modified version of Stein & Wheaton’s (2000) Computer Technology Scale. Course structure was assessed by three independent instructional designers using the Course Structure Rubric, developed for this study.
Correlation coefficients were utilized to examine the relationships between course structure, learner autonomy, computer technology experience and satisfaction with perceived knowledge gained in a Web-based course. Results partially supported the model, as computer technology experience was found to be related to learner autonomy, and learner autonomy was found to be related to satisfaction with perceived knowledge gained. Satisfaction with perceived knowledge gained was not, however, related to course structure in this study. Consequently, the model was revised.
Dedicated to my family and friends for all their support
ACKNOWLEDGMENTS

I would like to thank my advisor, Dr. David Stein, for his support and advice. He shared my enthusiasm for the topic and encouraged me when life tried to get in the way. His expertise and experience were much appreciated.

I would also like to thank my other committee members, Dr. Joseph Heimlich and Dr. Christopher Zirkle for their help and support. I would like to acknowledge the significant contribution of Dr. Joe Wheaton, who taught me how to apply statistics.

I would also like to thank the students and teachers at Ohio State who took their time to participate in this study. I am truly grateful for your assistance.

I would especially like to thank my fellow graduate students and friends – Joni Barnard, Constance Wanstreet, and Christine Overtoom, who provided their time and support when things looked grim. I would also like to thank Rosemary McMasters and Margaret (Peg) Thoms for getting me started on this path, and Mary Ann French and Joann Dennis for supporting me to the end.

Finally, I would like to say how grateful I am to my family, especially my parents Gene and Margaret Calvin, for all their support throughout seven long years of school and three degrees. You always believed I could do whatever I set out to do, even when I didn’t. I owe my successes in life to all of you.
VITA

August 5, 1954. Born – Lima, Ohio

1999 B.S., Ohio State University

2000 M.A., Ohio State University

1999 – 2003 Graduate Teaching Assistant, Ohio State University

2003-Present Graduate Research Assistant, Ohio State University

PUBLICATIONS


FIELDS OF STUDY

Major Field: Education

Human Resource Development
# TABLE OF CONTENTS

Abstract................................................................................................. ii

Acknowledgments.................................................................................. v

Vita......................................................................................................... vi

List of Figures........................................................................................ ix

List of Tables.......................................................................................... x

Chapters:

1. Introduction.......................................................................................... 1
   - Background.......................................................................................... 2
   - Problem Statement.............................................................................. 6
   - Conceptual Model............................................................................... 8
   - Purpose of Study............................................................................... 9
   - Research Questions.......................................................................... 10
   - Significance of Study...................................................................... 10
   - Definition of Terms.......................................................................... 11
   - Assumptions, Delimitations and Limitations of the Study.............. 13

2. Review of the Literature.................................................................... 16
   - Introduction...................................................................................... 16
   - Theoretical Framework................................................................... 19
   - Major Constructs............................................................................. 21
LIST OF FIGURES

Figure 1  Conceptual Model of Learning in Web Courses  ......................... 9
<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>142</td>
</tr>
<tr>
<td>2</td>
<td>143</td>
</tr>
<tr>
<td>3</td>
<td>143</td>
</tr>
<tr>
<td>4</td>
<td>144</td>
</tr>
<tr>
<td>5</td>
<td>145</td>
</tr>
<tr>
<td>6</td>
<td>145</td>
</tr>
<tr>
<td>7</td>
<td>146</td>
</tr>
<tr>
<td>8</td>
<td>147</td>
</tr>
<tr>
<td>9</td>
<td>147</td>
</tr>
<tr>
<td>10</td>
<td>148</td>
</tr>
<tr>
<td>11</td>
<td>149</td>
</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION

Learning at a distance is the fastest growing segment of adult education in the United States (Derrick, 2003). The advent of the World Wide Web (WWW), has allowed the field of adult education to pursue the Web as a tool for providing education at a distance (Bitter & Pierson, 1999; Derrick, 2003; Kanuka, 2001; Perreault, Waldman, Alexander & Zhao, 2002). The perceived potential of the WWW to provide greater flexibility for adult learners has driven an increased interest in learning at a distance (Barab, Hay, Barnett, & Squire, 2001; Derrick, 2003; Perreault, et al., 2002). However, there has been relatively little investigation into the pedagogy of providing learning for adults via the Web and there are few theories of online pedagogy (Garrison, 2000).

Much of the research in distance learning for adults has been conducted in formal educational settings, such as undergraduate and graduate programs (Derrick, 2003; Palloff & Pratt, 1999). From this research, there are indications that many adult learners are not able to adapt to online learning environments as they lack the required learning skills (Butler & Winne, 1995; Ellis, 2001; Hartley, 2001; Lanza & Rodelli, 1991; Song, 2002). Still, the flexibility offered by Web-based distance learning gives adults the opportunity to pursue lifelong learning (Derrick, 2003). These two conditions make it imperative that adult educators identify the conditions necessary for increasing the ability for adult learners to be autonomous in distance learning environments. Thus, it becomes
necessary to investigate adult learners’ ability to learn autonomously, as well as the online environment in which they are increasingly required to learn.

This exploratory study examined both a model of learning in Web-based courses and the environment of learners enrolled in courses designated as “distance learning” and taught via the Web at a large Midwestern university. The study utilized one of the few proposed theories of distance learning that addresses pedagogical issues and a socio-cognitive theory of self-regulated learning to inform a conceptual framework for examining whether structure of courses and learners’ ability to learn autonomously could explain and predict satisfaction with perceived learning in a Web-based course.

Background

Many adult educators have increased efforts to provide education at a distance as the Web has increased opportunities for learning at a distance to greater numbers of adults (Derrick, 2003; Palloff & Pratt, 1999; Vrasidas & McIsaac, 1999; Wilson & Lowry, 2000). In addition, some educational institutions are expecting faculty to develop online courses and to find methods for increasing student enrollments through Web course delivery (Derrick, 2003; Eaton, 2001). The adult students these institutions and teachers are targeting tend to be adults who have family and work responsibilities (Eaton, 2001). However, the research that exists on these adult Web-based learners indicates that many of these adult learners lack the skills required to learn in Web environments (Butler & Winne, 1995; Ellis, 2001; Hartley, 2001; Lanza & Rodelli, 1991; Song, 2002) and that there are few theories to assist teachers in the development of appropriate Web-based courses (Garrison, 2000). One theory Garrison (2000) describes as promising for the
development of a Web-based pedagogy is Moore’s proposed theory of transactional distance.

Moore’s proposed theory of transactional distance has occasionally been utilized as a framework for the study of how to provide education at a distance. First published in 1980, the theory was developed for correspondence, radio and television based distance education. The theory has been expanded and revised by Moore and explored by other researchers in other areas of distance education such as interactive video and the Web (Bishcoff, 1993; Brandon & Hollingshead, 1999; Ferrell & Moore, 2000-2001; Gunawardena, 1999; Hirumi, 2002; Klemm, 2000; Nelson, 1999; Oliver & Omari, 2001; Perreault, et al., 2002; Rickards & Fisher, 2000; Rovai, 2002; Saba, 1988; Saba & Shearer, 1994; Sherman, 1999; Stein & Wheaton, 2002; Vrasidas & McIsaac, 1999; Walther, 1996). Moore’s proposed theory of transactional distance postulates that structure, interaction (or dialogue) and learner autonomy combine to determine the level of psychological distance learners feel in all learning situations (Moore, 1992, 1993; Moore & Kearsley, 1996). According to Moore (1993), the greater this psychological distance, the greater the potential for misunderstanding or miscommunication on the part of the learner and, this potential for misunderstanding may impair learning. Moore postulates that due to the physical separation in all formats of distance courses, the potential for misunderstanding is so much greater that both instructors and learners must change their behaviors in order for learners to understand the course material (Moore & Kearsley, 1996).

The theory suggests that the way instructors must change their behaviors is by changing course structure and course dialogue (Moore & Kearsley, 1996). Learners must
change their behavior by becoming more autonomous in their learning (Moore & Kearsley, 1996; Keegan, 1996). Moore (1993) explains structure as the degree of flexibility in changing the course requirements to meet the needs of individual learners, while dialogue is explained as meaningful learner interactions on three levels: (a) instructor – learner; (b) content – learner; and (c) learner – learner. The proposed theory essentially states that transactional distance would be reduced by increasing dialogue and decreasing structure, while transactional distance would be increased by reducing dialogue and increasing structure (Moore, 1993; Moore & Kearsley, 1996). In conducting research on Moore’s proposed theory, Saba (1988) and Saba & Shearer (1994) included the environment or distance learning medium – learner, and environment – instructor interactions as additional types of interactions.

Learners must, according to Moore’s proposed theory, develop the skills required to learn on their own in order to decrease transactional distance in any type of distance education, including the Web. This increase in what Moore describes as learner autonomy would enable learners to determine the level of course structure that best meets their individual needs (Moore & Kearsley, 1996; Keegan, 1996).

Through these changes in behavior – by the instructors and the learners – transactional distance can be minimized and, the chances of misunderstanding and miscommunication will be greatly reduced allowing learners to meet their learning goals in a given course (Moore, 1992, 1993; Moore & Kearsley, 1996). In addition, Saba (1988) and Saba & Shearer (1994) suggest that when the distance learning medium utilized in the course allows learners and instructors to conduct synchronous dialogue, the transactional distance would also be decreased.
Garrison (2000) has suggested that one limitation of the proposed theory is that the “nature of the interrelationships among structure, dialog and autonomy is not clear” (p.7). Studies conducted utilizing Moore’s theory as the framework have not sufficiently answered this concern. For example, there have been a number of studies that examine one specific construct of Moore’s proposed theory. Most of these studies located have examined the role of interaction or dialogue in learning at a distance (Chen, 2001a; Chen, 2001b; Gresh & Mrozowski, 2000; Gunawardena, 1999; Hirumi, 2002; Lally & Barrett, 1999; Mahesh & McIsaac, 1999; Murphy & Cifuentes, 2001; Patterson, 1999; Rovai, 2002; Vrasidas & McIsaac, 1999). One study has examined the role of structure (Kanuka, 2001) and a few have examined learner autonomy (Chen & Willits, 1999; Huang, 2001). A few studies examined both structure and dialogue (Saba, 1988; Saba & Shearer, 1994; Stein & Wheaton, 2002). The Saba (1988) and Saba & Shearer (1994) studies made the assumption that the learners were sufficiently autonomous to adjust to differing levels of both structure and dialogue. The study by Stein and Wheaton (2002) sought to explain and predict satisfaction with perceived learning in a Web-based course by examining the role of both course structure and interaction. Contrary to expectations, satisfaction with the structure of the course was much more highly correlated to satisfaction with learning than satisfaction with the interaction in the course. The results of this study support Moore’s proposition that transactional distance is lower when the structure and interaction in a course match the learner’s needs. However, through in-depth interviews done with the same students, Stein and Wheaton (2002) found that learners consistently indicated that they wanted more structure. Additionally, when structure was lacking, participants reported problems learning. The seemingly contradictory results may be
explained by the methods used in conducting the study. The types of course structure and the level of structure in the course included in the study were not examined; data were only gathered on whether the participants were satisfied with the structure of their course. Consequently, future research should examine the types and levels of structure in courses, as well as the satisfaction students have with the structure of the courses they are enrolled in. In this way, researchers can further examine the levels and types of structure that lead to satisfaction with perceived learning in Web-based distance learning.

**Problem Statement**

While Moore’s proposed theory of transactional distance includes both dialogue and structure as primary constructs explaining transactional distance in learning, much of the research done has focused on the concept of interaction and dialogue rather than on course structure (Chen, 2001a; Chen, 2001b; Gresh & Mrozowski, 2000; Gunawardena, 1999; Hirumi, 2002; Lally & Barrett, 1999; Mahesh & McIsaac, 1999; Murphy & Cifuentes, 2001; Patterson, 1999; Rovai, 2002; Vrasidas & McIsaac, 1999.). However, course structure reduces ambiguity in learning and therefore reduces stress and cognitive load for the learner (Kearsley & Lynch, 1996; Witkin, 1972; Winne, 1995; Zimmerman, 2000). Other studies have shown that dialogue is only effective when appropriately structured into the course (Gunawardena, 1999; Mahesh & McIsaac, 1999; Thompson, Malm, Malone, Nay, Oliver & Saunders, 1997; Stein & Wheaton, 2002; Vrasidas & McIsaac, 1999). Thus, the role of structure and interaction in the reduction of transactional distance has yet to be determined.
Cognitive science has been examining the nature of self-regulation, and self-regulated learning in particular, for some time now. Many learners never gain a good understanding of how to regulate their own learning or the ability to use learned strategies in new learning situations (Winne, 1995; Woolfolk, 2004; Zimmerman, 2002). Results of studies in self-regulated learning have shown that for learners who are still at the lowest stages of self-regulatory development, instructors must provide structure in order for these learners to grasp new material and concepts – and for learners to learn to become more self-regulating (Azevedo, Cromley & Seibert, 2004; Garcia & Pintrich, 1994; McLoughlin, 2002; Weinstein & Mayer, 1986.) Further, there is some evidence that individual study at a distance lacks the modeling, social, and environmental influences that provide the structure or scaffolding required to improve self-regulatory skills (Perry, 2002; Winne, 1995; Zimmerman, 2000). Brooks (1995, cited in McMahon 2002) claims that learners who are not competent self-regulators can be “slaughtered” in Web-based distance learning courses. These learners are not autonomous or self-regulating in their learning (Zimmerman, 2001) and would therefore not be able to change their behaviors in distance learning as required in Moore’s proposed theory of transactional distance.

According to Moore’s proposed theory then, if these learners are unable to be autonomous in their learning, additional structure and dialogue would be required on the part of the instructors in order to reduce transactional distance. Consequently, learner autonomy, or the ability to self-regulate learning needs to be further investigated.

If course structure determines how autonomous adult learners have to be in Web-based courses, and if adult learners have varying abilities to be autonomous in learning situations, especially when learning at a distance, then the effect of both course structure
and learner autonomy on satisfaction with perceived knowledge gained in Web-based courses needs to be investigated. Since adult learners in formal education settings such as undergraduate and graduate programs offered via the Web constitute the fastest growing segment of adult education, examining the interrelationship between structure and autonomy will allow adult educators to structure the course environment to allow for varying levels of autonomy and to assist adult learners in developing the self-regulating skills required to learn in Web-based courses.

**Conceptual Model of Learning in a Web-based Course**

The research model for this study is conceptually illustrated in Figure 1. The model illustrates the relationship of the independent variables of autonomy (AS) and course structure (CSS), the potentially moderating variable of computer technology experience (CTE) and the dependent variable of satisfaction with perceived knowledge gained in a Web-based course (SKG). At the top level of the model, there is the individual characteristic of autonomy, measured for this study by a score on the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, et al. 1991; 1993) and labeled as AS (autonomy score). The individual’s ability to function autonomously may be moderated by their previous computer technology experience, labeled as CTE. Computer technology experience was measured by a Learner Profile Questionnaire subscale. The learner’s ability to function autonomously affects the particular course’s structure required to gain satisfaction with perceived learning. Course structure scores (CSS) were assigned by three independent instructional designers using the Course Structure Rubric. The linear combination of the learner’s ability to function
autonomously and the course’s structure result in the learner’s satisfaction with perceived knowledge gained in the Web-based course.

Figure 1. Conceptual Model of Learning in a Web-based Course

Purpose of Study

The purpose of this exploratory correlational study was to investigate how well a conceptual model of learning in a Web-based course explained learners’ satisfaction with perceived knowledge gained in Web-based courses. The relationships between the following set of independent variables were examined: (a) course structure; (b) learner autonomy; and (c) computer technology experience.
Research Questions

Within correlational research, research questions are provided to explain and suggest relationships between independent and dependent variables. In this study, the following research questions were investigated:

1. What is the relationship of course structure with a learner’s satisfaction with perceived knowledge gained in Web-based courses?

2. What is the relationship of learner autonomy with learner’s satisfaction with perceived knowledge gained in Web-based courses?

3. What is the relationship between a learner’s experience with computer technology and learner’s satisfaction with perceived knowledge gained in a Web-based course?

4. What are the inter-item relationships between course structure, learner autonomy, computer technology experience, and satisfaction with perceived knowledge gained in a Web-based course?

5. Which independent variables explain and predict the greatest amount of variance in the level of a learner’s satisfaction with perceived knowledge gained in a Web-based course?

Significance of Study

Adults continue to seek learning opportunities that provide flexibility and that respond to their immediate learning needs (Barab, et al., 2001; Derrick, 2003). At the same time, many institutions continue to offer more and more courses via the WWW (Bitter & Pierson, 1999; Derrick, 2003). However, the level and type of course structure that allows adults to learn best in online environments has not been adequately examined
(Derrick, 2003; Garrison, 2000). While there is some literature that examines Moore’s proposed theory of transactional distance, very few studies have investigated both structure and autonomy (or self-regulation) and none have investigated how the two effect the satisfaction adult learners have with their perceived learning. Further, few studies have been conducted on self-regulated learning in Web-based distance education and the preponderance of the empirical evidence for development of self-regulated learning has been done with K-12 learners. Studies that have investigated adult post-secondary students have not examined overall course structure and the support this may provide to learners who lack self-regulation for learning.

This study examined all three areas - flexibility and type of course structure, autonomy (self-regulated learning development level) and adult learners in courses designated as “distance learning” and taught via the Web at a large Midwestern university. This exploratory study provides information about the effectiveness of various types and levels of structure for adult learners with varying levels of self-regulatory development. Thus, the results of this study provide practical information about how to design and provide learning for adults via the WWW.

Definition of Terms

1. Course structure

   **Constitutive Definition:** Course structure includes course learning objectives, course goals, expectations of the instructor, learner participation requirements, assignments, due dates, work quality requirements, assessment, and teaching methods to be used (Kearsley & Lynch, 1996).
Operational Definition: The term as used in this study is explicated through the syllabi of the courses included in the study and includes course learning objectives, course goals, content themes, teaching methods, illustrations, work quality expectations of the instructor, learner participation and attendance requirements, assignments, tasks, text, due dates, planned interactions (instructor-learner, learner-learner, content-learner, and environment-learner), pedagogical framework for the course design, modeling and provision of appropriate cognitive strategies for the course, assessment and evaluation, technical assistance available, and the course environment or medium. Using the syllabi, the courses were evaluated by three instructional design experts utilizing a rubric designed for this purpose. A structure score was assigned to each course based on the rubric score.

2. Autonomy

Constitutive Definition: Autonomy is the degree to which a learner is able to be self-directed in their learning (Candy, 1991).

Operational Definition: The term as used in this study was defined as a learner’s score on the Motivated Strategies Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia & McKeachie, 1991; 1993) instrument measuring level of self-regulation for learning in a specific course.

3. Web-based course

Constitutive Definition: A Web-based course is any course which has all components or a portion of the components provided via the World Wide Web.

Operational Definition: The term as used in this study refers to undergraduate courses that were designated as “distance learning” in the master schedule of The Ohio...
State University during Winter Quarter, 2005 and taught via the Web. None of the courses included in the study met face-to-face more than twice in the ten week quarter as verified with the course instructors.

4. Satisfaction with perceived knowledge gained in a Web-based course

   **Constitutive Definition:** Satisfaction with perceived knowledge gained in a Web-based course is the degree to which a learner perceives that they have gained the knowledge they wanted to gain, and that the course description and syllabus indicated they should gain from course materials, activities, etc.

   **Operational Definition:** The term as used in this study refered to the learner’s score on the satisfaction with perceived knowledge gained questions on the Satisfaction Questionnaire, an instrument designed to measure satisfaction with various aspects of a course, including satisfaction with perceived knowledge gained (Stein & Wheaton, 2002).

Assumptions, Delimitations and Limitations of the Study

As in all research, there were basic assumptions made regarding the premise of the study, limitations inherent in the collection of data and delimitations based on choices the researcher made in the design of the study.

The first assumption of this study was that participants gave accurate responses in the completion of the instruments used to collect data in this study. Next, an assumption was made that undergraduate college students were equivalent to adult learners. These assumptions led to some of the delimitations of the study.
Delimitations are those items within the design of the study over which the researcher has control in limiting the scope of the study. This study was delimited to undergraduate students age eighteen and over, enrolled in courses at The Ohio State University designated as “distance learning” in the master schedule during Winter Quarter 2005 and taught via the Web. The instruments that were completed by the subjects were all administered via the Web in order to facilitate data collection.

Limitations of the study represent those design areas that present potential weaknesses to the study that can be identified but not completely controlled. Limitations of this study included the geographic area readily accessible for the sample, the type of institution where the study took place and the self-selection of the students into courses designated as “distance learning” in the Ohio State master schedule for Winter Quarter 2005 and that are taught via the Web. Specifically, the population of adult learners was limited to undergraduate students enrolled in “distance learning” courses at The Ohio State University Winter Quarter 2005, taught via the Web, that met face-to-face no more than twice during the quarter, and for which the instructor agreed to participate in the study.

The Ohio State University is a public institution with undergraduate enrollments that consist primarily of students from Ohio, thereby potentially limiting the variance in the sample population and limiting the generalizability of this study. The sample frame consisted of all students enrolled in courses designated as “distance learning” in the master schedule at The Ohio State University during Winter Quarter, 2005 and verified as being taught via the Web with no more than two face-to-face meetings during the ten week quarter. These students self-selected into the courses, thereby limiting the
generalizability of the study to undergraduate students enrolled in “distance learning” courses at Ohio State. The undergraduate courses included in the study covered a wide range of subjects and levels of students – from freshman to seniors, and subjects from eight colleges throughout the university - and this may have impacted participants’ abilities to function autonomously in school in general and Web-based courses in particular. The instruments that the subjects completed were both self-report instruments. Participants were provided with explanations of how to complete the instruments, confidentiality was maintained, and students were not required to participate in an effort to ensure honest and accurate responses on the instruments utilized in the study.
CHAPTER 2
REVIEW OF THE LITERATURE

Introduction

The purpose of this study was to investigate a proposed model of learning in Web-based courses, which included how well course structure and learner autonomy explain and predict adult learners’ satisfaction with perceived knowledge gained in Web-based courses. In particular, this study examined the relationships between the independent variables of course structure, learner autonomy, computer technology experience, and the dependent variable of satisfaction with perceived knowledge gained for undergraduate adult learners enrolled in undergraduate courses designated as “distance learning” in the master schedule at a large Midwestern university Winter Quarter, 2005 and taught via the Web. This study was necessary because Web-based formal distance education is the fastest growing segment of adult education and the limited research done to date indicates that many adults lack the skills required to succeed in Web-based distance education courses. Consequently, research on the structure of Web course environments and adults’ ability to function autonomously in these Web-based learning environments was required.

A literature search was conducted on each of the variables included and the major theoretical frameworks. The following databases were searched: Education Abstracts, Psychological Abstracts, PsychINFO 1966-Present, Dissertation Abstracts,
ERIC, Academic Search Premier, Business Source Premier, Computer Source, Sociological Collection on ABI, Communication and Mass Media Complete, and The Psychology and Social Sciences Database on ABI. These databases were chosen based on recommendations from librarians at the Education Library at the Ohio State University. Searches on keywords (structure, instructional design, distance learning, distance education, hypermedia, World Wide Web, transactional distance, interaction, autonomy, adult education, computer experience, self-directed learning and self-regulated learning) produced several thousand articles, books, and dissertations, which were then examined based on their abstracts for those which seriously considered the variables included in this study. Because this study examines Web-based learning environments, the focus of the literature search was 1995 through 2005, as few studies on Web-based distance education were published before that time frame. A manual search was then conducted of the top journals in education and psychology, such as The American Journal of Distance Education and Educational Psychology, and books by major theorists such as Zimmerman and Moore, to determine whether there were additional articles or chapters that might apply to this study.

The conceptual scheme of this study was derived from Moore’s proposed theory of transactional distance (Moore, 1991, 1993; Moore & Kearsley, 1996) and Zimmerman’s socio-cognitive theory of self-regulated learning. Moore’s proposed theory describes the interaction between three components of transactional distance and how to lessen this potential for misunderstanding on the part of the learner. He suggests that miscommunication and the inability to learn at a distance might be mediated by the flexibility of course structure, interactions or dialogue in the course, and the learner’s
level of autonomy (Keegan, 1996; Moore, 1991, 1993; Moore and Kearsley, 1996). Socio-cognitive self-regulated learning theory, has been described as similar to self-directed learning and autonomy (Zimmerman, 1989, 2000; Zimmerman & Schunk, 1998), and suggests that learners new to a subject or in a novel learning environment rely on scaffolding (structure) provided in the course, modeling of cognitive strategies by their instructors and peers, and on observations of their instructors and peers to learn course materials.

This review of the literature is divided into four sections. The first section provides an overview of Moore’s proposed theory of transactional distance. The second section discusses each of the three major constructs of the proposed theory in detail, first providing a definition, then an analysis of the research to date. The construct of learner autonomy is discussed both from Moore’s proposed function in learning at a distance and from the self-regulation perspective. An argument for the proposed model of learning in a Web course is supported through this literature and a rationale for utilizing a measure of socio-cognitive self-regulation as a proxy for learner autonomy is presented. In the third section, variables believed to impact learning are described in relation to the dependent variable of satisfaction with perceived knowledge gained. Finally, the fourth section of this review provides a summary of the literature on the impact of structure and autonomy on learning in Web-based environments and proposes that there are several areas requiring further research.
Theoretical Framework

Theory of Transactional Distance

First published in 1980, Moore’s proposed theory of transactional distance focuses on mediating the communication transaction inherent in all learning (Moore & Kearsley, 1996). The notion that there is a transaction inherent in all learning situations between the learner and the instructor was based on the work of Boyd & Apps (1980) and was intended to include the interactive nature of the learning situation. That is, the environment, the learner, the content and the instructor all interact to create the transaction of learning (Moore, 1993, Moore & Kearsley, 1996). And, in any communication transaction (in this case a teaching – learning transaction) there is the potential for misunderstanding or miscommunication (Rumble, 1986). In distance education, or distance learning, the transaction is said to change due to the physical separation of the learner and the instructor. Moore postulates that this physical or geographic distance increases the potential communications gap inherent in any learning transaction, and as a result increases the potential for misunderstanding (Moore, 1991, 1993; Moore & Kearsley, 1996). Transactional distance is thus seen as a continuum.

Moore further proposes that there are specific behaviors on the part of both instructor and learner that can mediate this transactional distance. For the instructor, Moore states that the “special teaching behaviors” (Moore & Kearsley, 1996, p. 201) that can mediate transactional distance encompass both the structuring of the course and the dialogue planned into the course. In addition, Moore proposes that the structure of the
course must be flexible to meet an individual learner’s requirements. Structure therefore, is defined in the proposed theory as having high or low flexibility.

The learner’s behavior is also thought to impact transactional distance. Moore postulates that the “greater the transactional distance, the more responsibility the learner has to exercise” (Moore & Kearsley, 1996, p.204). Thus, the more transactional distance in a course, the more autonomous the learner would have to be to reach their learning goals (Moore, 1991, 1993; Moore & Kearsley, 1996). Transactional distance then, is proposed as a combination of the structure and design of the course, the levels and types of dialogue/interaction within the design and structure of the course, and the level of autonomy the course requires of the learner (Moore, 1991, 1993; Moore & Kearsley, 1996). According to Moore’s propositions then, high structure (i.e., low flexibility in the structure) and low dialogue would result in high transactional distance while low structure (i.e., high flexibility in the structure) and high dialogue would result in low transactional distance. The higher the transactional distance, the greater the autonomy required on the part of the learner to mediate the transactional distance.

Although Moore based his proposed theory on his work in distance education provided through correspondence, television and radio, the constructs have been utilized as a framework in numerous studies on Web-based distance education (Chen, 2001a, 2001b; Gresh & Mrozowski, 2000; Gunawardena, 1999; Hirumi, 2002; Huang, 2002; Kanuka, 2001; Lally & Barrett, 1999; Murphy & Cifuentes, 2001; Patterson, 1999; Rovai, 2002; Vrasidas & McIsaac, 1999). In addition, many of these studies have focused on adult learners in university settings. Collectively, these studies indicate that
the proposed theory of transactional distance is applicable to research settings similar to
the one utilized for this study. A review of each of the three constructs of the proposed
theory follows.

Major Constructs of the Theory

Interaction

*Definition.* In his earliest work on his proposed theory of transactional distance,
Moore defined dialogue rather simply as communication between the student and teacher
(Moore, 1980), however as work progressed and the theory began to be tested, Moore
expanded the concept to include learner - learner, learner – instructor, and learner –
content interactions (Bischoff, Bisconer, Keegan, 1996; Kooker & Woods, 1996; Moore,
1989; Moore & Kearsley, 1996). Learner – instructor interactions in face-to-face
learning situations have been found to have an effect on learning outcomes (Powers &
Rossman, 1985; Swan, 2002). And, in socio-cognitive learning theories, the literature
indicates that knowledge is constructed through social interactions with others – both the
instructor and other learners (Bandura, 1987; Howland & Moore, 2002; Merriam &
Caffarella, 1999; Swan, 2003). While Moore’s propositions were based on distance
learning done through correspondence, radio broadcasts, and television broadcasts, there
is no reason to suppose that these propositions would not also hold true in Web-based
learning (Iran-Nejad, 2001; Swan, 2003; Tu & McIsaac, 2002).

Many studies have examined interactions within Web-based courses and have
found that interactions of all three types can assist in the useful construction of
knowledge by adult learners, although not all utilize Moore’s proposed theory of
transactional distance as the theoretical framework (Bishcoff, 1993; Brandon & Hollingshead, 1999; Ferrell & Moore, 2000-2001; Gunawardena, 1999; Hirumi, 2002; Klemm, 2000; Nelson, 1999; Oliver & Omari, 2001; Perreault, et al., 2002; Rickards & Fisher, 2000; Rovai, 2002; Saba, 1988; Sherman, 1999; Stein & Wheaton, 2002; Vrasidas & McIsaac, 1999; Walther, 1996). While most of these studies did not explicitly examine the structure of the courses included, the results of these studies indicate that dialogue and interactions of all types must be carefully structured into the course design in order to aid knowledge construction (Brandon & Hollingshead, 1999; Ferrell & Moore, 2000-2001; Gunawardena, 1999; Hirumi, 2002; Klemm, 2000; Nelson, 1999; Oliver & Omari, 2001; Sherman, 1999; Rickards & Fisher, 2000; Rovai, 2002; Stein & Wheaton, 2002; Vrasidas & McIsaac, 1999; Walther, 1996). Thus, there is growing evidence that interaction or dialogue is a subset of the structure construct and impacts transactional distance through the structure of the course. Consequently, planned interactions of all types were included in the structure score assigned to each course included in the present study.

Structure

Definition. Moore’s proposed theory of transactional distance defines structure as “the rigidity or flexibility of the programme’s educational objectives, teaching strategies, and evaluation methods. It describes the extent to which an education programme can accommodate or be responsive to each learner’s individual needs” (Moore, 1993, p. 26). This concept of structure is compatible with socio-cognitive theories of self-regulated
learning that recommend scaffolding and support for low self-regulating learners and less for high self-regulating learners (Pressley, 1995; Winne, 1995; Woolfolk, 2004; Zimmerman, 1989; Zimmerman, 2002). However, in order to understand how flexible course structure can mediate transactional distance, the concept of structure must first be defined.

Moore and Kearsley (1996) describe structure as “elements as learning objectives, content themes, information presentations, case studies, pictorial and other illustrations, exercises, projects, and tests” (p. 202). Kearsley and Lynch (1996) added elements such as “the planned interactions between instructor and students” (p. 191), the method by which the course content is presented, and student evaluation or assessment. Still other educational researchers added instructional goals (Bryant, 1978; Fuchs, Bahr & Rieth, 2001; Johnson, Johnson & Tauer, 1979; Karabenick & Collins-Eaglin, 1997; Kastner, Gottlieb, Gottlieb & Kastner, 2001), the modeling and provision of cognitive strategies (Davidson-Shivers, Nowlin, & Lanquette, 2002; Dean & Webster, 2000; Winne, 1995; Zimmerman, 1989; Zimmerman, 2002), scaffolding (Azevedo, Cromley & Seibert, 2003; Brush & Saye, 2001; Hannafin, Land & Oliver, 1999; Hogan & Pressley, 1997; Jackson, Krajcik & Soloway, 2000) task structures (Thornton, 1999; Tolhurst & Debus, 2002; Wilson, Andrew & Sourikova, 2001), text structure (Englert & Mariage, 2001; Schermer, 2001) and the course environment or medium (DeRoma, Martin & Kessler, 2003; Dillon, 2000; Gunawardena & Duphorne, 2000; Hardre, 2001; Lally & Barrett, 1999; Vrasidas, 2002; Westhead, 1996) as components of course structure. Flexible structure then,
according to Moore, means adjusting each of these recognized components of course structure to meet the individual needs of each learner (Kearsley & Lynch, 1996; Moore, 1993; Moore & Kearsley, 1996).

Research Issues with Structure

As evidenced by the above list, each researcher examined only one or two components of course structure in their studies and comparatively few have studied components of structure specifically in Web-based courses (Allen, 2001; Chen, 2001a; Davidson-Shivers, et al., 2002; Rovai, 2002; Tolhurst & Debus, 2002; Vrasidas, 2002; Westhead, 1996). None examined a broad definition of course structure and its overall effect on learning in Web-based courses.

Although Moore clearly states in his proposed theory that interaction must be planned into the course – i.e., structured – a majority of the studies using Moore’s proposed theory as a framework have focused on the interaction construct (Chen, 2001a; Chen, 2001b; Gresh & Mrozowski, 2000; Gunawardena, 1999; Hirumi, 2002; Lally & Barrett, 1999; Mahesh & McIsaac, 1999; Murphy & Cifuentes, 2001; Patterson, 1999; Rovai, 2002; Vrasidas & McIsaac, 1999), while comparatively few studies have explicitly examined the construct of structure (Kanuka, 2001; Saba, 1988; Saba & Shearer, 1994; Stein & Wheaton, 2002) and fewer still have examined the construct of autonomy (Chen & Willits, 1999; Huang, 2001). Additionally, much of the research done on course structure has been conducted in K-12 settings. Despite these inconsistencies with the current study, the findings of these studies provided direction and support for the study of structure on learning outcomes.
Overall Course Structure. Kearsley and Lynch (1996) state that the structure of a course is explicated through the syllabus and any supplemental study guides or course packets. The courses included in their study defined structure as the course objectives, course goals, prerequisites, evaluation and assessment schemes, the text to be used, course topics, the course schedule, and a bibliography. The study also indicated that study/preparation suggestions were provided and self-evaluation exercises tied together all of the elements of the course. These items were seen as important by participants, despite the fact that these students should not have been novices in the subject areas. This is an important observation, as it supports the idea of providing structure for learners during the early phases of learning, or in novel environments, when it is more difficult to utilize even well known learning strategies. Further, the study suggests overall that distance learning programs require a high degree of structure in order for learners to be successful, rather than a highly flexible degree of structure, which contradicts Moore’s theoretical construct to some extent. While this study did not examine Web-based distance education courses, it seems likely that there would be similar structural requirements.

Overall Structure and Environment. Davidson-Shivers, et al. (2002) examined lesson structure in a multimedia lesson and its impact on writing performance with college undergraduates. The study examined how lesson structures, environment or course medium, and a student’s ability to self-regulate learning affected composition quality. Random versus prescribed lesson structures were chosen because in a randomly prescribed lesson, cognitive load should be increased and students would have more difficulty in learning the lesson concepts as a result whereas, in a fully prescribed lesson,
the cognitive load should be less, and students would focus better on the concepts to be learned. In addition, a novel course environment or medium should increase cognitive load.

However, in this study the sample was biased, as only 3% were studying new information, and many of the participants could be designated as experts on the subject. Based on their literature review of self-regulated learning, the researchers should have determined the level of previous knowledge prior to the lesson. They did not; consequently, the lesson may have been irrelevant. In addition, a majority of the participants stated that they routinely used a computer for writing, so the lesson medium (environment) probably did not increase cognitive load. This study was important conceptually to the current study for four reasons. First, it implies lesson structure and course environment are important components of course structure. Second, it implies the increased cognitive load caused by lesson or task structure impacts the learner’s ability to use known self-regulated learning skills, thereby affecting the student’s ability to be autonomous in learning. Third, this study suggests that the environment, or medium, impacts cognitive load, therefore, environment should be examined as part of course structure. Finally, the study shows the need for additional research into these components of structure due to the limitations of their study.

The studies examined thus far relate to overall structure and the importance of structure in learning in novel environments. However, studies that have examined structure have tended to limit the components included in the course structure variable or have not attempted to specifically analyze the overall structure of the course(s) in the
study. The following section examines an element of course structure that is often overlooked when examining how course structure relates to learning.

*Goal Structures.* Educational goal structures refer to whether the learners work and are evaluated independently, competitively or collaboratively in the course and whether the goals emphasize mastery or performance (Bryant, 1978; Karabenick & Collins-Eaglin; 1997; Johnson, et al. 1979) Goal structures were proposed earlier in this review as a component of the course structure variable.

Karabenick and Collins-Eaglin (1997) examined college courses for their goal structures and the impact of these goal structures on learning strategy use and mastery levels. They hypothesized that courses that emphasized mastery and had cooperative goals would have learners that used more learning strategies and achieved higher levels of mastery. Using selected items from the Motivated Strategies for Learning Questionnaire (an instrument designed to measure self-regulated learning) (Pintrich, et al., 1991, 1993), they measured students’ cognitive strategies, their organization skills, their elaboration skills, their critical thinking skills, and their use of planning, comprehension monitoring and regulating (metacognitive skills). They found that collaborative goal structures led to greater levels of engagement and high mastery levels. However, this study did not examine overall course structure and did not consider Web-based environments per se. Further, this was a correlational design, and causality could not be established. Still, in addition to providing support for goal structures as part of the structure variable, the study includes further evidence that self-regulated learning may be influenced by course structure – specifically goal structures.
Satisfaction with Structure. A few studies have examined the learners’ perceptions of course structure (Huang, 2002; Kanuka, 2001; Stein & Wheaton, 2002) without explicating what structure is. That is, they either asked whether the students were satisfied with the structure in their course (Huang, 2002; Stein & Wheaton, 2002), or they investigated what students believed to be needed in Web-based education (Kanuka, 2001). In the Kanuka (2001) study, participants indicated that the greatest problem with technology delivered education was the lack of organization. This included not only the Web interface, but the information provided as to the conduct of the course as well. Among the undergraduate participants, there was an especially strong desire for more structure within the courses. However, at the graduate level, participants were less likely to request additional structure. “Specifically, the graduate students seemed to feel they benefit most from a flexible course structure where they assume a greater amount of responsibility with respect to the course activities and aspects of the course content” (p.65). It is important to note that even with these graduate students, a high level of structure was required, but with the flexibility to allow them to make the course more relevant to their own learning. These findings are compatible not only with Moore’s proposed theory of transactional distance, but also with socio-cognitive self-regulated learning theory which indicates that learners who are new to a subject require more structure and support as they are unable to use known learning strategies as efficiently due to increased cognitive load. As students progress, they are better able to determine the learning strategies that will best assist them in meeting their own learning goals.
(Winne, 1995; Zimmerman, 1989, Zimmerman, 2000; 2002). In addition greater structure is required in novel learning environments as students learn the self-regulatory skills the environment requires.

A Stein & Wheaton (2002) study conducted both quantitative and qualitative analyses of learners’ perceptions of course structure. The quantitative analysis found that there was a strong positive correlation between satisfaction with course structure and satisfaction with perceived knowledge gained. This meant that the more participants were satisfied with course structure, the more likely the participants were to be satisfied with what they believed they learned in the course. The qualitative analysis indicated that learners wanted additional structure. While the study did not analyze the level of structure in each course, or measure the participants’ ability to be autonomous in their learning, the findings do suggest that both of these variables should be investigated to determine which learners require what levels of structure under what circumstances.

The studies examining structure indicate that there are multiple components of course structure and that each of them has an impact on learning. Further, these studies point out that individual learners have differing needs for structure in learning situations. This need for structure has been labeled autonomy in Moore’s proposed theory of transactional distance and is the one element of his theory that has been investigated the least. In the next section, the concept of autonomy will be defined and discussed as it relates to both Moore’s proposed theory, socio-cognitive self regulated learning theory, and to the conceptual model proposed in this study.
Autonomy

Definition. According to Moore, when transactional distance is high learners must take on more responsibility for their learning (Moore & Kearsley, 1996). Moore’s interpretation of autonomy is that “learners have different capacities for making decisions regarding their own learning” (Moore & Kearsley, 1996, p. 205). Cognitive and educational psychologists studying metacognition, and how individual differences impact learning have identified the theory of self-regulated learning as similar to autonomy (Zimmerman & Lebeau, 2000).

Zimmerman defines socio-cognitive self-regulated learning as “a process by which learners transform their mental abilities into academic skills” (Zimmerman, 2002, p. 65). It involves the “selective use of specific processes that must be personally adapted to each learning task” (Zimmerman, 2002, p. 66). While self-regulated learning has diverse theoretical backgrounds, Zimmerman (1989, 2000, 2002) contends that a “common conceptualization has emerged” (1989, p. 284) among social-cognitive self-regulated learning theorists. Self-regulated learners possess the cognitive skills required to initiate, plan and direct their own learning; are motivated to learn the topic; set goals for their learning; select strategies to achieve these goals; and, can evaluate progress toward their learning goals. How well the learner knows appropriate cognitive strategies and whether the learner has previous knowledge on the subject both impact the ability to self-regulate in a given learning situation (Winne, 1995; Winne, 1996; Zimmerman, 1989; Zimmerman & Lebeau, 2000; Zimmerman & Martinez-Pons, 1990). Novel learning environments may also inhibit the use of known self-regulation skills (Howard-Rose & Winne, 1993; Pintrich & DeGroot, 1990; Pressley, 1995; Rabinowitz, Freeman &

Further, various socio-cognitive self-regulated learning theorists contend that self-regulated procedures for learning can be developed through social contact with other learners who have acquired self-regulated learning skills through the use of modeling, prompts, cues, etc., and the provision of scaffolding (structure) until the skills are acquired (Bandura, 1987; Boekaerts, Pintrich & Zeidner, 2000; Corno & Boekaerts, 2005; Winne, 1995; 1996; Zimmerman, 1989; 2000; Zimmerman & Martinez-Pons, 1990).

The preceding paragraphs indicate that self-regulated learning closely matches common conceptualizations of learner autonomy posed by researchers such as Candy (1991), Blumberg (2000), and Merriam & Caffarella, (1999). Consequently, a measure of the ability to self-regulate learning was selected as a suitable indication of a learner’s ability to be autonomous in their learning.

**Measuring Autonomy.** Measuring autonomy for learning has been an ongoing problem for adult educators. Because the adult education literature uses autonomy and self-directed learning interchangeably (Merriam & Caffarella, 1999), many studies utilize instruments designed to measure self-directed learning as a measure of learner autonomy. However, problems with the two most commonly used instruments have been described in detail (Candy 1991). Of greatest concern is the charge that the most commonly used instrument – the Self-Directed Learning Readiness Scale – has not demonstrated sufficient reliability or validity for measuring self-direction (Field, 1989, cited in Candy, 1991, p. 151). Since the level of ability to self-regulate in learning is an indication of
how autonomous a learner can be (Schunk & Zimmerman, 2000; Zimmerman & LeBeau, 2000), an instrument that measures self-regulated learning was used to measure autonomy in the investigation of the conceptual model of learning in Web-based courses proposed in this study.

Self-regulated learning theorists have developed two instruments designed to measure a learner’s capacity to be self-regulating in their learning that are context dependent. While no instrument is perfect, both have demonstrated reasonable reliability in numerous tests and there is general consensus that both are valid measures of self-regulated learning. The Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, et al., 1991, 1993) was used to measure autonomy for this study as it was designed to measure a learner’s ability to self-regulate in a specific course. The next section discusses the research to date on autonomy and course structure.

Research Issues in Self-Regulated Learning and Structure. Several studies have examined self-regulated learning in Web-based learning environments (Azevedo, et al., 2003; Hargis, 2000; Joo, Bong & Choi, 2000; McMahon & Oliver, 2001; Song, 2002; van den Boom, Paas, van Merrienboer & van Gog, 2004). Additional authors have taken other’s work on self-regulated learning and scaffolding and conceptualized how structural support might benefit learners on the Web (McLoughlin, 2002: McMahon, 2002; McManus, 1996). However, none of these studies have examined the structure of the course per se. Additionally, none have examined the level of self-regulation of the participants in relation to learning outcomes within the conceptual model proposed in this study.
Hargis (2000) examined self-regulated learning and self-efficacy for computer use in an experimental design that randomly placed engineering students in either a constructivist course environment or a behaviorist course environment. When the researcher examined the results he found no significant difference in test scores between the two environments. Yet, the researcher claims that preliminary results “indicate that the better a student is at regulating their own learning, the higher their chances of success while learning on the internet” (Hargis, 2000, p. 5). While there is research based evidence to support this finding (Yang, 1993; Zimmerman, 1996; Winne, 1995), this study did not find statistical significance based on self-regulated learning scores because there was no variance in the self-regulated learning scores of the participants. All of the subjects scored quite high on the Motivated Strategies for Learning Questionnaire, thus, the treatment made no real difference as all of the subjects were highly self-regulating learners. This study does provide support for the contention that previous knowledge has a great impact on self-regulated learning in a given domain and that the ability to self-regulate will drive the level of structure required by the learner.

Azevedo, et al (2004) approached the topic from a slightly different perspective. In their study, they examined different types of scaffolding (structured support) in hypermedia environments to determine whether different types of scaffolding would improve self-regulation among the learners. Participants were randomly assigned to adaptive scaffolding, fixed scaffolding or no scaffolding. The scaffolding was designed to facilitate the participants’ ability to self-regulate their learning in a hypermedia course. The subjects were all freshman biology students and pretests indicated that all of the participants were novice learners on the topic. Results indicated that using an adaptive
scaffolding model resulted in learners using more cognitive strategies, having a deeper understanding of the material and higher performance on the post test. These results are important to the current study as they support the importance of cues, prompts, modeling, and feedback in helping learners become more self-regulating, or autonomous, in their learning. In addition, these results indicate that environment and previous knowledge also have an impact on the ability to self-regulate. More importantly, the results indicate that greater structure is required early in a course, but less so as students develop self-regulatory skills. However, the study did not examine overall course structure nor did it measure the level of self-regulation these participants had for learning - both variables that could confound these findings. Consequently, additional research is required to determine whether course structure might impact the participants’ ability to function autonomously.

While Azevedo et al. (2004) and Hargis (2000) investigated whether or not participants believed self-regulating skills had developed in their Web-based learning environment; neither study asked the participants about their learning in the course of study. That is, the researchers utilized grades and test scores as measures of learning, rather than directly asking the learners about their learning. This may be due in part to the controlled laboratory approach to the studies. Rather than examining the phenomenon of self-regulated learning and its relationship to learning in a more natural setting, such as an intact classroom, these studies placed the participants in short experimental learning situations. Consequently, we still know very little about how learners in Web-based environments feel about their learning or how learners feel about their ability to function autonomously in Web-based courses from the self-regulation literature. However, there
are two studies utilizing Moore’s proposed theoretical framework that have included autonomy in their analyses. The next section will discuss these studies.

**Autonomy and the Theory of Transactional Distance.** There are two studies using Moore’s proposed theory of transactional distance as a framework that specifically examined the autonomy construct. The Chen and Willits (1999) study used a factor analysis to determine the components of autonomy. While this study helped to define the autonomy construct, it did not measure participants’ levels of autonomy in relation to how well the participants learned in the study nor was the study conducted in a Web-based course. The study does point out the complexity of each of the constructs of Moore’s proposed theory, and in this respect provides support for using a more complex measure for autonomy, such as a measure of self-regulated learning.

Huang (2002) based his examination of autonomy on Chen and Willits’ (1999) study and found support for their construction of autonomy. In addition, he found that autonomy was correlated to computer skills and to interaction and, that as flexibility in the course structure decreased, the need to exercise autonomy increased. However, Huang (2002) also did not measure participants’ levels of autonomy. Neither study examined how course structure might affect a learner’s ability to be autonomous in learning. Consequently, we still know very little about how autonomy functions within the Moore’s proposed theory and how autonomy impacts perceived knowledge gained in a Web-based course. There is, however some support to suggest that the ability to self-regulate learning may drive the required level of course structure. Huang also found that previous experience with computers was correlated with autonomy. Other studies have found similar results and are discussed in the next section.
Potentially Moderating Variables

Computer and Web-Based Course Experience

Collins (1998) reported that adult learners who are required to use a computer or the Web may have reactions ranging from eagerly adopting new technology to becoming completely terrified of attempting to use new technology. Early studies of adult learners indicated that adults lacked computer experience which interfered with their ability to successfully complete distance education courses (Campbell-Coggins, 1988, 1995; Howard, 1986). However more recently the results of studies on the effects of previous computer and Web experience on learning in Web-based courses have been mixed. Stein & Wheaton (2002) found no significant correlation between computer or Web-based course experience and satisfaction with perceived knowledge gained in a Web course. However, in this study there was very little variance in the computer and Web experience scores among the participants. That is, all of the participants reported at least average experience with both the computer and the Web. That all participants were comfortable using these course tools may be the reason there was no significant relationship between computer and Web experience and satisfaction with knowledge gained.

Joo, et al. (2000) found that self-efficacy for computer and Web tasks correlated highly with self-efficacy for Web-based instruction. Participants who believed they were proficient on the computer or in Web environments were more likely to believe they would be successful in a Web-based learning environment. Overall course grades confirmed that students who had self-efficacy for the computer and Web received higher grades.
Ford and Chen (2000) found a number of correlations between Web experience and learning in hypermedia environments. Specifically, they found that there was a positive relationship between Web experience, gain on post test scores, and cognitive strategy use. Again, this study did not examine satisfaction with perceived learning, only scores on pre and post tests in specific lessons.

Lim (2001) also found a relationship between computer self-efficacy and satisfaction on the part of adult learners in distance education on the Web. The purpose of her study was to create a predictive model for the satisfaction and future participation of adult learners in Web-based distance education programs. Lim examined years of computer use, frequency of computer use, computer training, Internet experience in a class, and participation in a workshop for a Web-based course as measures of computer and Web experience. The study found an overall significant relationship between computer self-efficacy and satisfaction in the course, however, frequency of computer use and participation in the workshop had negative correlations while computer use and Internet experience in a course had positive correlations. In the overall predictive model, computer self-efficacy had the highest linear correlation with intent to take future Web-based courses of all the demographic variables included in the study. This study indicates that computer experience and previous experience in Web-based courses may correlate to overall satisfaction with Web-based distance education among adult learners. What it does not tell us is whether computer and Web experience correlates to satisfaction with what is learned in a course or how they relate.

These studies illustrate the need to further study computer and Web experience and their impact on satisfaction with perceived learning in Web courses. For this study,
overall computer technology experience was measured using the Computer Technology Experience section of the Learner Profile Questionnaire (See Appendix B). The proposed conceptual model of learning in a Web course suggests that computer technology experience would impact learner autonomy rather than directly impacting satisfaction with perceived knowledge gained.

As can be seen from the preceding discussion of variables that have been studied in distance learning in general, and Web-based distance learning in particular, very few studies have examined the learners’ satisfaction with the perceived knowledge they gain in distance courses of any kind. The next section discusses the limited research done on satisfaction with perceived knowledge gained.

Satisfaction with Knowledge Gained

Adult learners have multiple motivations for seeking learning opportunities (Darkenwald & Novak, 1997; Kasworm, 1995; Merriam & Caffarella, 1999). Consequently, adults may also have varying criteria for determining whether or not they have gained what they intended to gain - or needed to gain - from a learning experience (Kanuka & Nocenté, 2003; Kasworm, 1995). Therefore, test and/or course grades may not be an adequate outcome measurement (Donaldson & Graham, 1999). Because adults seek learning to achieve specific goals, to have social opportunities, or to seek knowledge for its own sake (Houle, 1961; Merriam & Caffarella, 1999), adult learners may not strive for - or recognize - grades as an adequate measure of their learning (Donaldson & Graham, 1999). Rather, adult learners want what works best for them (Burge, 2000; Phillips & Kelly, 2000).
Guolla (1999) combined customer satisfaction theory and teaching evaluation theory to determine whether students were satisfied clients of college graduate and undergraduate courses. Satisfaction research has investigated the interrelationships between the antecedents and consequences of satisfaction. In examining the interrelationships between the expectations students have of college courses, and their overall satisfaction with the knowledge the participants perceived they had gained, Guolla (1999) found that learning was most closely related to overall satisfaction. That is, those respondents who felt they had learned what they wanted or needed to learn were more likely to be satisfied overall with the course and with the teaching of the course. However, this study did not examine the specifics of the course structure or the learners’ ability to self-regulate their own learning. In addition, the setting of the study was in traditional face-to-face classrooms.

Stein and Wheaton (2002) utilized satisfaction with perceived knowledge gained in various types of distance and face-to-face courses and found that there was a strong positive relationship between satisfaction with course structure and satisfaction with perceived knowledge gained. However, not all courses in the study were Web-based and actual course structure was not examined. As a result, the use of satisfaction with perceived knowledge gained in Web-based courses as a dependent variable remains to be investigated.

What the literature reviewed does indicate is that self reports of satisfaction with perceived knowledge gained in a course may be a better indicator of achievement for adult learners than more traditional measures of course grade or final exam scores (Stein & Wheaton, 2002).
Summary

The literature reviewed in this chapter covers the theoretical frameworks that informed the conceptual model for the study and the independent and dependent variables that were examined. This section of the review summarizes the information covered on the variables and the need for this study.

Course Structure

Course structure may impact how adult learners perceive their learning by providing flexibility that allows these adults to focus on their individual learning needs, rather than requiring them to follow a rigidly prescribed course of study, and by providing planned opportunities for various types of interactions. The studies reviewed on course structure indicate that there are multiple components of course structure and that these components, or a lack of them, have an impact on learning. However, the majority of these studies did not examine overall course structure or they did not ascertain the learners’ perspective of the course structure. In addition, most studies examining course structure did not utilize Moore’s proposed construct of structure in the conceptual model, nor did they examine the impact of providing structure on the ability to function autonomously in the courses. Most did not examine structure in Web-based courses. Finally, the few studies that did ask learners whether they were satisfied with the structure of a course did not define what constituted the course structure, nor did the studies examine the level of structure in the courses included in the study. For this study, course structure was measured using a rubric designed to determine the level of structure
in each course, and multiple components of structure were included, including planned interactions and the degree of flexibility in the courses.

**Autonomy**

For adult learners, the ability to be autonomous or self-regulating in learning, may impact perceptions of learning as less autonomous learners may require additional course structure in order to successfully gain the knowledge or skills they require while more autonomous learners may resent a more controlled environment.

Few studies have examined the construct of learner autonomy in Web courses. Those that have indicate that autonomy is a complex construct that requires further study. The socio-cognitive theory of self-regulated learning has been compared to autonomy and includes many components that directly affect the ability to learn independently as is often required in Web-based courses.

The literature on self-regulated learning indicates that the ability to self-regulate correlates with achievement on test scores and course grades. While little work has been done that examines the effect of self-regulated learning in Web-based learning environments, there is some evidence that self-regulated learning skills can be developed in Web courses, and that this additional support can have an impact on learning outcomes. In addition, the studies examined indicate that the theoretical basis for the instructional design of the course interacts with the learner’s ability to self-regulate. None of these studies have directly measured autonomy or examined how course structure impacts the ability to be self-regulating in learning.
This study utilized the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, et al., 1991, 1993) to measure self-regulation for learning directly. A self-report instrument, the MSLQ includes 15 subscales grouped under the categories of Learning Strategies and Motivation. The subscales measure a range of components that constitute the ability to function autonomously in learning situations that generally have not been included in previous studies. The conceptual model proposed in this study suggests that it is learner autonomy that drives the level of course structure required by the learner.

Computer Technology Experience

The results of the studies examining computer and Web experience in relation to learning in Web-based courses are mixed. There is some evidence that experience with both increases a student’s belief that they will be successful in Web-based courses. However, only two studies examined specific aspects of computer and Web experience and only one of those found any significance based on computer or Web experience. The Lim (2001) study did not investigate satisfaction with perceived learning in the courses included in the study while the Stein & Wheaton (2002) study did examine satisfaction with learning, but found no relationship between computer and Web experience and satisfaction with learning. Consequently, computer and Web experience and their impact on learning in Web-based courses need to be further explored. Studies on computer experience and self-regulated learning indicate that self-efficacy for computer and Web tasks may increase self-regulation by increasing self-efficacy for computer and Web tasks in Web courses.
This study obtained information on both computer and Web technology experience through the Computer Technology Experience section of the Learner Profile Questionnaire, based on the Demographic Questionnaire developed by Stein and Wheaton (2002). This section of the instrument included subscales that measure experience with computers, the Internet, E-mail, Web course software, and keyboard skills. A summed score of these subscales provided the Computer Technology Experience (CTE) score.

Satisfaction with Perceived Knowledge Gained

No literature was found that examined satisfaction with perceived knowledge gained in a course that included course structure and autonomy as variables. The adult education literature indicates that adult learners may have different goals in pursuing education, and that these are generally intrinsically motivated. For this reason, traditional measures of achievement may not be appropriate for adult learners. There is a very limited literature base that indicates that learners’ satisfaction with learning may be a good indicator of whether a course and an instructor are meeting the needs of the students. Consequently, satisfaction with perceived knowledge gained was used as the dependent variable for this study.

Web-based distance education has been described as the fastest growing segment of adult education, yet the literature indicates that we know little about how adults learn in Web-based environments. In addition, few theories of learning for online or Web-based distance learning exist. This study examined a conceptual model of learning in Web-based courses based on Moore’s proposed constructs (1991, 1993) and
Zimmerman’s socio-cognitive self-regulated learning theory (1989, 2000) within an adult education context that is seen as representing the majority of adult distance learners – those adults enrolled in Web-based undergraduate and graduate formal education programs. In doing so, the study investigated the primary research question of whether course structure and a learner’s ability to function autonomously in a Web-based course could explain learner’s satisfaction with what they perceive they learn in the course. The next chapter outlines the specific procedures used for the investigation of this research question.
CHAPTER 3
METHODS

Introduction

Web-based distance education is a rapidly growing format for adult education (Derrick, 2003). However, few studies have examined the learning that takes place in Web-based distance education courses and there are few pedagogical theories of distance learning in any format (Garrison, 2000). Moore’s proposed theory of transactional distance is one pedagogical theory that has the potential to assist adult educators in understanding how to construct Web-based learning environments that facilitate learning. Moore (1991, 1993) postulates that if we can manipulate the structure of the course, the levels and types of planned dialogue in the course we can reduce the potential for misunderstanding. Moore also suggests that if course structure and planned dialogue are not adequate for learners, then the learner will have to have greater autonomy in order to reduce the transactional distance.

Autonomy has been compared to socio-cognitive theories of self-regulation (Zimmerman & LeBeau, 2000). The literature on self-regulated learning indicates that the ability to self-regulate correlates to achievement scores and course grades. However, many adult learners lack the self-regulatory skills required to successfully complete Web courses.

This study utilized both the proposed theory of transactional distance and socio-cognitive self-regulated learning theory to conceptualize a model of adult learning in
Web-based courses. The model states that computer technology experience moderates the ability to function autonomously in a Web course. The level of autonomy of the learner in a particular course then drives the level of course structure required by the learner. The linear combination of these variables was proposed to determine the level of satisfaction with perceived knowledge gained in a Web-course.

Purpose of Study

The purpose of this exploratory descriptive correlational study was to investigate how well course structure, learner autonomy and computer technology experience could explain undergraduate adult learners’ satisfaction with perceived knowledge gained in courses designated as “distance learning” in the master schedule Winter Quarter 2005, and taught via the Web at a large Midwestern university.

Research Questions

In this study, the following research questions were investigated:

1. What is the relationship of course structure with learner’s satisfaction with perceived knowledge gained in Web-based courses?

2. What is the relationship of learner autonomy with learner’s satisfaction with perceived knowledge gained in Web-based courses?

3. What is the relationship between a learner’s experience with computer technology learner’s satisfaction with perceived knowledge gained in a Web-based course?

4. What are the inter-item correlations between course structure, learner autonomy, computer technology experience, and learner’s satisfaction with perceived knowledge gained in a Web-based course?
5. Which independent variables explain and predict the greatest amount of variance in the level of a learner’s satisfaction with perceived knowledge gained in a Web-based course?

Research Design

This exploratory correlational study involved a set of independent variables and a single dependent variable; therefore, the study planned to utilize a multi-variable analysis technique (Newton, & Rudestam, 1999). The set of independent variables selected were used to explain relationships to the dependent variable in terms of strength and importance for learners’ satisfaction with perceived knowledge gained in Web-based courses. Descriptive and demographic data for the participants were also gathered.

Independent Variables

The set of independent variables included in this study were: (a) course structure; (b) learner autonomy; and (c) computer technology experience.

Course structure has been used as an independent variable in a number of studies (Kanuka, 2001; Saba, 1988; Saba & Shearer, 1994; Stein & Wheaton, 2002), however only one (Stein & Wheaton, 2002) has utilized this independent variable relative to learners’ satisfaction with perceived knowledge gained in Web-based courses.

Autonomy, or self-regulation in learning, has been examined in numerous studies (Azevedo, et al., 2003; Chen & Willits, 1999; Hargis, 2000; Huang, 2001; Joo, et al., 2000; McMahon & Oliver, 2001; Song, 2002; van den Boom, et al., 2004), however,
none of these studies used self-regulated learning to investigate the relationship to learners’ satisfaction with perceived knowledge gained in Web-based courses.

Callan (2001) has suggested that the access a learner has to computer technology, and the experience using a computer a learner gains through access to computer technology is influential in whether a learner can successfully complete a distance course. The definition for each independent variable follows.

Course Structure

Course structure was defined as the course learning objectives, course goals, content themes, teaching methods, illustrations, work quality expectations of the instructor, learner participation and attendance requirements, assignments, tasks, text, due dates, planned interactions (instructor-learner, learner-learner, content-learner, and environment-learner), theoretical framework for the course design, modeling and provision of appropriate cognitive strategies for the course, assessment and evaluation, technical assistance available, and the course environment or medium that are included in the course syllabi. A course structure score was assigned by a panel of independent instructional design experts for each course based on a rubric developed for this study to analyze course structure.

Autonomy

Autonomy, or the ability to self-regulate learning, was defined for this study as a learner’s score on the Motivated Strategies for Learning Questionnaire (MSLQ) developed by Pintrich, et al. (1991). The MSLQ utilizes fifteen subscales to measure
various components of self-regulation in specific learning situations. The MSLQ was section II of the Learner Profile Questionnaire (see Appendix B).

Computer Technology Experience

Computer technology experience consists of experience with computers and Web technologies and was measured in section I of the Learner Profile Questionnaire (see Appendix B). Experience with computer and Web technologies has been suggested as influential in whether learners can successfully complete distance programs. Previous studies (Hill & Hannafin, 1997; Joo, et al., 2000) have examined computer technology experience in relation to course grades or test scores, rather than in relation to satisfaction with perceived knowledge gained in a course and have focused on whether or not having self-efficacy for using a computer would impact self-efficacy for completing a Web-based course. Results of studies have been mixed, with some indicating that experience both on computer and Web technologies effect learning in Web-based courses (Hill & Hannafin, 1997; Joo, et al., 2000), while others have shown no significant effect (Stein & Wheaton, 2002).

Dependent Variable

The dependent variable in this study was learner’s satisfaction with perceived knowledge gained. A learner’s satisfaction with knowledge gained was measured using the Satisfaction Questionnaire, adapted from an instrument developed by Stein & Wheaton (2002). A high score on the instrument indicated that the learner is highly satisfied with their perceived knowledge gained in the course. Stein and Wheaton did not measure satisfaction with specific components of structure as they were investigating the
general satisfaction with overall course structure, and not measuring course structure. For this study, a course structure score was assigned and learners’ satisfaction with specific elements of structure was also investigated.

Population and Sample

The target population of this study was all undergraduate students age 18 or older enrolled in courses below the 700 level and designated as “distance learning” in the master schedule at the Ohio State University Winter Quarter 2005, and taught via the Web. Once the courses were identified, the instructors were contacted to verify that the course was taught via the Web and that the course would meet face-to-face no more than two times during the ten week quarter. The sampling frame for the study was limited to all undergraduate students age eighteen and over, enrolled in these verified Web courses designated as “distance learning” in the master schedule at The Ohio State University as of January 19 (census day) 2005. There were twenty-two eligible courses with enrollments of 1920 students. The sample for this study was selected by first obtaining permission from all instructors of the undergraduate courses which met the study criteria to obtain the course syllabus. Fourteen instructors agreed to participate. This reduced the population of students eligible for the sample to 658. Next, a list of all undergraduate students over the age of 18 enrolled in these fourteen courses on census day was compiled by obtaining a list of the enrolled students from the Registrar’s office. The list was obtained after the course census date to ensure no potential subjects are omitted thereby avoiding frame error. The list was checked for duplicates and any duplicate
students were removed to avoid selection error. Subjects were selected using a simple random selection process for the study from this sampling frame. A random number generator was used to determine the students selected as subjects from the sampling frame for the study.

The sample size was determined utilizing the recommendation of Hair, Anderson, Taham, & Black (1998) to have from 10-20 cases for each independent variable to provide adequate statistical power in the multiple regression analysis at an alpha level of .05 and a power level of .8. There were two independent variables and one potentially moderating variable in the analysis; consequently a sample size of 60 students was required. However, participation in the study was voluntary and response levels on surveys can be as low as 25% (Newton & Rudestam, 1999). In addition, university policy limited the type and frequency of contact with the randomly selected students. This limit that allowed contact only through email made it likely that response rates would be low. Consequently, 240 students were randomly selected from the frame and asked to participate in the study to ensure that at least 60 participants were included.

In an effort to obtain the highest possible participation and response rates in spite of the contact limitations, each instructor who agreed to participate in the study by sharing their course syllabus was asked to post a notice on their course Web site. This message from the instructor to their students stated that the course was included in a study and that individual students might be randomly selected to participate in the study. The notice stated that participation was voluntary and that non-participation would not affect grades in the course, but encouraged students to participate. A copy of this notice is included in Appendix A. This helped ensure that the students at least read the emails
sent by the researcher, explaining the study and asking them to participate. All emails sent to the students included links to the Web site where the forms for data collection were available. Copies of the emails for the students are included in Appendix A. All respondents who completed both questionnaires were entered into a random drawing for two $100.00 gift certificates to an online book store. The Web site URL for data collection was http://education.osu.edu/calvinj.

Each course for which an instructor agreed to participate was analyzed for structure utilizing the Course Structure Rubric developed for this study by a panel of three instructional design experts. The summed scores of the Course Structure Rubric from each instructional designer were averaged to obtain the structure score used for analysis.

Instrumentation

This section includes information on each instrument that was used in the study. The instruments included: (a) Motivated Strategies for Learning Questionnaire (MSLQ); (b) Demographic Questionnaire; (c) Course Structure Rubric; and (d) Satisfaction Questionnaire. For data collection purposes, the Demographic Questionnaire and the MSLQ were combined into the Learner Profile Questionnaire. A copy of each instrument is included in Appendix B.

Motivated Strategies for Learning Questionnaire

The Motivated Strategies for Learning Questionnaire (Pintrich, et al., 1991) is a self-report instrument that assesses student’s “motivational orientations and their use of
different learning strategies for a college course” (p.3). The instrument contains two sections, one on motivation containing 31 items, and one on learning strategies, containing 50 items. Each section contains numerous subscales designed to be used either individually or together. For this study, all 15 subscales were used. The subscales for each section and the Chronbach’s alpha value from the developers’ original research of the instrument are:

Motivation Section:

1. Intrinsic Goal Orientation (r = .74)
2. Extrinsic Goal Orientation (r=.62)
3. Task Value (r = .90)
4. Control of Learning Beliefs (r = .68)
5. Self-Efficacy for Learning and Performance (r = .93)
6. Test Anxiety ( r = .80)

Learning Strategies Section:

1. Rehearsal (r = .69)
2. Elaboration (r = .76)
3. Organization (r = .64)
4. Critical Thinking (r = .80)
5. Metacognitive Self-Regulation (r = .79)
6. Time and Study Environment (r = .76)
7. Effort Regulation (r = .69)
8. Peer Learning (r = .76)
9. Help Seeking (r = .52)
The developers conducted a confirmatory analysis on each section: motivation and learning strategies. In addition, the developers conducted omnibus fit statistics. The results indicate reasonable values indicating factor validity for the scales.

The instrument was originally designed for paper and pencil in class completion; however it has been tested as an online instrument and has been shown to be as reliable and valid when administered online as it is when administered in class (McManus, 1996). In addition, the instrument was designed for measuring self-regulation in face-to-face courses, however the McManus (1996) study also found that the instrument was as valid and reliable in Web-based tasks and courses as in face-to-face courses.

Subjects rate themselves on a seven point Likert type scale where a “1” indicates the item is “not at all true of me” and a “7” indicates the item is “very true of me.” Each subscale score is computed by summing the subscale items and calculating the average.

For this study, the entire Motivated Strategies for Learning Questionnaire was placed in a Web page at http://education.osu.edu/calvinj, allowing the responses to be submitted electronically and directly loaded into an Excel file for scoring. The MSLQ was section II of the Learner Profile Questionnaire.

Demographic Questionnaire

The Demographic Questionnaire was originally developed by Stein & Wheaton (2002) specifically to collect information on learners participating in Web-based courses and has been modified for this study. In addition to the usual demographic questions, such as age, race, and sex, the demographics questionnaire asks students to rate their level of experience with computer and Web technologies. To ascertain this information,
three subscales, in addition to the demographic section from the Demographics Questionnaire were used. The instrument originally used a four point scale which was expanded to a 7 point scale for this study. The subscales are experience with (a) the Internet; (b) On-line Course Assistive Software, and (c) E-mail. The scale for all the questions was from 1 (no experience) to 7 (very experienced). Reliability and validity of the subscales were established in tests of the instrument. For this study, the Demographic Questionnaire was section I of the Learner Profile Questionnaire. All data were collected via a Web form at http://education.osu.edu/calvinj.

Satisfaction Questionnaire

The satisfaction questionnaire, also developed by Stein and Wheaton (2002), was given at the end of the course, before grades were posted. Stein and Wheaton’s original instrument consisted of three parts: questions 1 through 4 asked the respondent to rate satisfaction with the interactions in the course, questions 5 through 7 asked the respondent to rate satisfaction with the structure of the course and questions 8 and 9 asked about satisfaction with learning in the course. Question 10 asked the student to rate his or her overall satisfaction with the course. According to Stein & Wheaton (2002), the internal reliability for the entire satisfaction questionnaire was an alpha of .96. The internal reliability of the structure subscale was an alpha of .87, and the alpha of the overall satisfaction portion was .87. For this study, the Satisfaction Questionnaire sections on structure and satisfaction were revised to include questions on specific elements of structure and the final question was omitted, resulting in a nine item instrument. Reliability and validity were established through the tests of the instrument.
Course Structure Rubric

The Course Structure Rubric was developed specifically for this study. The rubric lists components of course structure identified in the literature review and included in the operational definition of “Course Structure” provided in Chapter 1. A panel of three instructional designers examined each course syllabus and assigned a score ranging from “1”, indicating the structural element is not present or indicated in the syllabus, to a “3” indicating that the structural element is clearly presented and well explained for the students. A second set of scores using the same scale were assigned for flexibility on each component of course structure. The scores for each element were then summed and a “Course Structure score” was assigned to each course. The reliability and validity of the Course Structure Rubric, along with inter-rater reliability were assessed in tests of the instrument. Intraclass correlations were used to determine the inter-rater reliability and .7 was set as the acceptable inter-rater reliability coefficient (Newton & Rudestam, 1999).

Reliability

Four summed scales were used in the collection of data for this study. Chronbach’s alpha was used to determine the internal reliability of the satisfaction with perceived knowledge gained scale, the course structure rubric, the Motivated Strategies for Learning Questionnaire (Pintrich, et al., 1991) and the computer technology scale, while intraclass correlations were used to determine the inter-rater reliability on the course structure rubric.

The satisfaction with perceived knowledge gained score is a summed subscale of the Satisfaction Questionnaire (Stein & Wheaton, 2002) which participants completed at
the end of the course. There are two questions that ask the participant to rate aspects of their perceived overall knowledge gain in a course using a Likert-type scale. Stein and Wheaton found an internal reliability alpha of .87 for the subscale. For this study the internal reliability coefficient of the subscale was an alpha of .73.

The computer technology experience scale was a subscale of the Learner Profile Questionnaire and was completed at the beginning of the course. The subscale was adapted from an instrument developed by Stein & Wheaton (2002). The scale consists of fifteen items which ask the participant to rate their experience with various computer technologies on a Likert-type scale from 1 (no experience) to 7 (very experienced, could or have taught others). For this study, the internal reliability of the instrument was an alpha of .904.

Learner autonomy was measured for this study with the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 1991) as part of the Learner Profile Questionnaire. The MSLQ is an 81 item self-report instrument designed to assess a student’s ability to self-regulate their learning in a particular course. For this study, the MSLQ internal reliability alpha was .952. As this is high, the confirmatory factor analysis done by the developers was reviewed: the parameter estimates for the factors were within reasonable ranges, so the high coefficient should not be cause for concern.

The Course Structure Rubric was designed for this study and was scored for each course by three independent instructional designers. The raters utilized the syllabus to assign a score for twenty structural components of each course. Scores range from 1 (not present on the syllabus); 2 (present and the student would recognize the component); to 3 (clearly explained on the syllabus). A second score was given for flexibility on each
structural component, using the same scale. As this was a new instrument, a review of the instrument was done by the instructional designers and minor revisions were made. Training was conducted and intraclass coefficients were used to compare the raters. The coefficient on single measures, using an alpha model with absolute comparison, was .851 and on average measures was .945 for the test data.

Following training, the raters were each provided with the fourteen syllabi for the courses participating in the study. Each rater independently scored a rubric for every course syllabus. Inter-rater reliability based on intraclass coefficients for single item measures was .617 and for average measures was .829; both are within the acceptable level. The reliability coefficient for the forty item scale was an alpha of .753 for this study.

Data Collection

Data were collected at The Ohio State University during Winter Quarter 2005. Prior to selecting participants, courses under the 700 level designated as “distance learning” in the master schedule of The Ohio State University Winter Quarter 2005 were identified, and the instructors were contacted to determine whether each course was taught via the Web, whether the students met face-to-face more than two times during the ten week quarter, and whether the instructor was willing to participate in the study. Only undergraduate courses that were taught via the Web and that met face-to-face no more than twice during the ten week quarter were eligible for the study. Of those courses that met these criteria, all instructors were asked to participate. Instructors were contacted by
phone to gain verbal agreement for participation, and a form to be signed was sent to all instructors who agreed to participate in the study by sharing their syllabus. Any instructor who could not be reached by phone after one week was contacted by email. For any instructor who had not responded to the email within 3 days, the researcher attempted to contact them by visiting their Ohio State office. For any instructor who had not been contacted by the end of Autumn Quarter, a letter requesting their participation and consent form was sent to their Ohio State office with a request to reply by January 7, 2005. Copies of the letter and consent form are located in Appendix A. Instructors sent their syllabi for the courses included in the study in January 2005.

Students

Data collection was conducted during February and March, 2005. Prior to sending emails to the students, undergraduate courses designated as distance learning in the master schedule for winter quarter were identified. Permission to include the courses in the study was requested from the instructors and fourteen instructors gave consent. These course numbers were provided to the Registrar’s Office and a list of students enrolled in the courses was obtained. Omitted from this list were any students who had asked that their names and email information be kept private by the university. Duplicate names were removed from the list as well with the final number of potential student participants at 658. Two hundred and forty students were randomly selected from this final list to participate in the study. Participation was voluntary and every contact with the students reiterated the voluntary nature of the study and that non-participation would in no way impact their grade in their course.
Two weeks prior to sending the initial email message to the students, each instructor was asked to post a notice on their course Web site indicating that the course was participating in the study and encouraging students to participate. Again, this notice stated that participation was voluntary and that non-participation would in no way impact the student’s grade in the course.

The initial email explained the purpose of the study, reiterated that participation was voluntary, provided a link to the Web site for the Learner Profile questionnaire, and provided a case number for the student to use when completing each questionnaire. The first follow up reminder was sent two weeks after the initial email was sent, with additional reminders sent weekly there after. All follow up reminders provided the Web link and the student’s assigned case number. Each email reminder was targeted to only those students who had not yet completed the Learner Profile.

The Satisfaction questionnaire was to be completed the last week of the quarter, and the questionnaire was not added to the Web site until the appropriate date. An email was sent to all 240 students requesting that they complete the second questionnaire; however, if the student had not yet completed the first questionnaire, the email sent to that student requested that both instruments be completed. Copies of all emails are located in Appendix A.

Response Rates

A total of two hundred forty undergraduate students were randomly selected from all students enrolled in courses designated as distance learning in the winter quarter master schedule at a large Midwestern university. These 240 students were sent an initial
email with a request to participate and containing a link to the Web site with the
questionnaires. Five follow-up email letters were sent to those who had not completed
the questionnaires at set intervals. Seventy students completed both online questionnaires
by April 1 2005; however two cases lacked a course number and were unusable in the
study resulting in a response rate of 28.3%, or 68 complete cases.

Response Error

Early respondents were identified as those who completed both instruments by the
end of finals week for winter quarter. Late respondents were identified as those who
completed one or both of the instruments during spring break or the first week of spring
quarter. All data collection ceased April 1 2005, at midnight.

In order to assess response error, a comparison of early to late respondents was
conducted (Ary, Jacobs & Razavieh, 1996). Since late respondents tend to be similar to
non-respondents, this method allows the researcher to determine whether any significant
differences exist on given responses. This method is preferable to comparing
respondents and non-respondents on known characteristics, as it utilizes information from
actual responses rather than demographic variables.

T-tests indicated that the sample showed no significant differences on group
means between early and late respondents on the variables of learner autonomy (MSLQ
score), computer technology experience and overall satisfaction with perceived
knowledge gained. Table 1 shows the results of the t-test for independent samples.
<table>
<thead>
<tr>
<th></th>
<th>Levene’s Test for</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equality of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Variances</td>
<td></td>
</tr>
<tr>
<td>MSLQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances Assumed</td>
<td>.960 .331</td>
<td>-1.435 68 .156 -.309 .215</td>
</tr>
<tr>
<td>Computer Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td>1.28 .262</td>
<td>-.522 68 .604 -.146 .279</td>
</tr>
<tr>
<td>Satisfaction with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Knowledge</td>
<td>.321 .573</td>
<td>-.547 68 .586 -.198 .361</td>
</tr>
<tr>
<td>Gained</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. T-tests of early and late respondents

Course Structure

Each instructor who agreed to participate provided their winter quarter syllabus in electronic format, and each syllabus was analyzed by three instructional designers using a rubric to measure course structure designed for this study. Overall the scores are low, ranging from a low of 52 to a high of 77.33. The scale used was from 40-120 and the reliability coefficient for the rubric was a = .753. Students from only twelve of the
fourteen eligible courses participated in the study; the structure scores assigned for each of the twelve are listed in Table 4.7

<table>
<thead>
<tr>
<th>Course</th>
<th>Rater #1</th>
<th>Rater #2</th>
<th>Rater #3</th>
<th>Average Structure Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59</td>
<td>62</td>
<td>58</td>
<td>59.67</td>
</tr>
<tr>
<td>2</td>
<td>54</td>
<td>50</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>3</td>
<td>52</td>
<td>58</td>
<td>59</td>
<td>56.33</td>
</tr>
<tr>
<td>4</td>
<td>52</td>
<td>49</td>
<td>55</td>
<td>52</td>
</tr>
<tr>
<td>5</td>
<td>74</td>
<td>79</td>
<td>79</td>
<td>77.33</td>
</tr>
<tr>
<td>6</td>
<td>55</td>
<td>63</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td>7</td>
<td>54</td>
<td>48</td>
<td>69</td>
<td>57</td>
</tr>
<tr>
<td>8</td>
<td>59</td>
<td>57</td>
<td>62</td>
<td>59.33</td>
</tr>
<tr>
<td>9</td>
<td>53</td>
<td>58</td>
<td>60</td>
<td>57</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
<td>52</td>
<td>69</td>
<td>57</td>
</tr>
<tr>
<td>11</td>
<td>56</td>
<td>67</td>
<td>68</td>
<td>63.67</td>
</tr>
<tr>
<td>12</td>
<td>49</td>
<td>57</td>
<td>63</td>
<td>56.33</td>
</tr>
</tbody>
</table>

Table 2. Course Structure Scores (Note: Scale = 40-120)

Satisfaction with Perceived Knowledge Gained

The Satisfaction Questionnaire was added to the Web on March 7, 2005, the beginning of the tenth week of the quarter; the same date that participants received the email asking them to complete the instrument and reminding them that to be eligible for the gift certificate drawing they had to complete both instruments.

Data from the student participants was collected in an Excel spreadsheet (using the case codes) for clean up, then moved into SPSS version 13 for statistical analysis.
Reminder emails were sent to any participants who did not complete and submit the Satisfaction Questionnaire by the end of the eleventh week of the quarter. Copies of these email messages are located in Appendix A.

Data Analysis

The data were analyzed utilizing the Statistical Package for the Social Sciences (SPSS) version 13. An alpha level of .05 and power level of .8 were set a priori as the criteria for statistical significance in the analyses performed. Research questions 1-3 were questions of magnitude and strength of relationships, therefore statistics that calculate the strength and magnitude of relationships between two variables were selected to analyze the data and answer the questions. Research question five asked how well a learner’s satisfaction with perceived knowledge gained can be explained through knowledge about certain other variables that can be measured through carefully constructed, reliable, and valid instruments. The purpose of a regression equation is to explain the linear relationship of a group of independent variables and their role in the variance of a single dependent variable. Thus, it was expected that analyzing the data collected on the independent variables in this study would support a proposed model of adult learning in Web courses. While this study utilized a convenience sample, and therefore could not be generalized beyond the learners enrolled in undergraduate courses designated as “distance learning” at Ohio State University, it was expected that examining this question through the inferential statistic of multiple linear regression would offer a first exploratory look at how course structure and a learner’s ability to self-regulate combine to explain how satisfied learners might be with the perceived
knowledge gained in Web-based courses. However, the linear regression analysis was not conducted as only one significant relationship between an independent variable in the set and the dependent variable was observed.

First, the data were analyzed utilizing descriptive statistics, including frequencies, central tendency measures of mean, mode and median, as well as variability measures of standard deviation, variance and range. Pearson product moment coefficient correlations were calculated to determine the relationships between the dependent variable learner’s satisfaction with perceived knowledge gained in a Web-based course, and the independent variables of course structure, learner autonomy, and experience with computer technology. An inter-item correlation matrix was constructed in order to answer question 4. Finally, hierarchical multiple linear regression was planned, but not conducted for question five.

Had statistically significant relationships been identified, the potentially moderating variable of computer technology experience would have been entered into the regression model first in order to identify the proportion of variance explained in the dependent variable by the potentially moderating variable. Next, course structure would have been entered as this is a course level variable. Finally, learner autonomy would have been entered in the third step as this is an individual level variable. Both course structure and learner autonomy would have been entered in order to determine the amount of variance explained in the dependent variable that is explained by the major independent variables after the moderating variable is accounted for (McCracken, 1991).
Ethical Research

In order to ensure that this study was conducted in accordance with the ethical standards required by The Ohio State University, the following procedures related to the collection and storage of data were followed.

Every effort was made to minimize any potential risks to the student participants. The Registrar’s Office provided only student names and email addresses for students enrolled in undergraduate courses designated as “distance learning” in the OSU master schedule, where instructors agreed to participate in the study by providing their course syllabus. All student names and email addresses were kept confidential. The entire list of names and addresses were kept on a separate diskette in a locked safe in the researcher’s home for the duration of the study. Once the study was completed, the diskette holding the list of names and email addresses was destroyed. Participation in the study was voluntary and participants could discontinue participation at any time with no consequences to them. A code was assigned to each participant and this code was used to ensure that complete cases were collected. The only time the cases were matched to the names and email addresses was to contact the winners of the two random drawings for $100 gift certificates to an online book store. Only students who completed both surveys were eligible, and once the two winning case codes were drawn, those two participants were identified from the list of student names and email addresses. Once the students were contacted and they notified the researcher how and where they wanted to receive them, the diskette containing the list with the names and addresses was destroyed.
The instructors posted an announcement about the study on their course Web site encouraging students to participate if selected. This announcement clearly stated that participation was voluntary. While there may have been a perception of pressure to participate from the instructor of the course, all correspondence from the researcher reiterated the voluntary basis for participation in the study and reminded them that they could drop out at any time with no consequences.

Student participants should have felt free to respond to the surveys honestly as their instructors had no access to the individual data collected, and will not see any overall results of the study until the end of Spring Quarter, long after course grades for Winter Quarter have been posted. At no time will instructors have access that could link an individual student with a response in the study as all participants had an assigned code for data collection purposes and these codes were not utilized or reported in the final report of the study.

Direct potential benefits to the student participants were minimal. All student participants who complete both instruments were eligible for random drawings to award two $100.00 gift certificates to an online book and music store. While it was hoped that this incentive would increase participation, the amount was not sufficient to influence answers on the instruments or to result in students feeling coerced into participating in the study.
CHAPTER 4
RESULTS

Learning at a distance is a fast growing segment of adult education (Derrick, 2003). However, the literature indicates that many adult learners are unable to adapt to Web-based learning environments as they lack the required ability to self-regulate their learning in novel environments (Butler & Winne, 1995; Ellis, 2001; Hartley, 2001; Song, 2002). One way to accommodate these learners is to provide additional structure to assist them in their learning while they develop the necessary self-regulatory skills (Corno & Boekaerts, 2005; Zimmerman, 1989, 2000). Using constructs from Moore’s proposed theory of transactional distance (1991, 1993), and socio-cognitive self-regulated learning theory (Zimmerman, 1989, 2000) the purpose of this study was to investigate a conceptual model of learning in Web-based courses. Specifically this exploratory study investigated the relationships between the independent variables of (a) course structure, (b) learner autonomy, (c) computer technology experience and the dependent variable of satisfaction with perceived knowledge gained in a Web-based course.

This chapter outlines the results of the analysis of the data collected. It is divided into two sections: (a) descriptive statistics for the participants, (b) results of descriptive and inferential statistics and discussions for the research questions.
Descriptive Statistics for Participants

Females comprised 68.6% (n=48) of the sample while males comprised 31.4% (n=22). Most participants were 21, the mean age was 22.6 (S.D. = 4.028) and the range was 18 to 40. The results are listed in Table 3 in Appendix C. The majority of the students participating in the study were White (80%); an additional 7.1% were African American, 7.1% were Bi or Multi Racial, and 4.3% were Asian. The results are listed in Table 5 in Appendix C.

Although some of the courses were open to both undergraduate and graduate students, participation was limited to undergraduate students over the age of 18 and continuing education students not enrolled as graduate students. The majority of the students who participated were seniors (48.6%) with juniors making up the next largest group (28.6%). Very few freshmen (7.1%) and continuing education (1.4%) students participated in the study. There were 14.3% sophomores. The results are listed in Table 6 in Appendix C.

In addition to asking students to report their experience level on specific computer technologies, participants were asked to report their overall years of computer and Internet experience. The student participants reported that they have many years of computer experience (Mean = 11.07, S.D. = 3.1) and internet experience (Mean = 8.23, S.D. = 2.3). The minimum number of years of computer experience was five years and
the maximum was twenty. The minimum number of years of Internet experience was four and the maximum was fifteen. The results are listed in Table 7 in Appendix C.

Autonomy

The students in the study completed the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991) as part of the Learner Profile. This instrument provides information on the student’s ability to self-regulate their learning in a particular course and was used as a measure of learner autonomy for this study. The instrument utilizes a Likert-type scale ranging from 1(not at all typical of me) to 7 (very typical of me). The mean of the MSLQ scores was 4.22 (S.D. = 0.78) with a minimum score of 1.93 and a maximum score of 6.32.

Course Enrollments

Courses included in the study covered a wide range of subjects and levels. Although students were randomly selected from fourteen courses, only twelve of these courses had student participants in the study. The majority of the students participating in the study were enrolled in 100 level courses (60%) , with an additional 15.6% enrolled in 200 level courses, 10% enrolled in 300 level courses, 8.6% enrolled in 500 level courses, and 5.8% enrolled in 600 level courses.

Course Participation

All instructors for courses designated as distance learning in the master schedule for winter quarter were contacted regarding participation in the study. Instructor consent
was obtained as the instructors were required to submit their course syllabi for analysis regarding course structure and to post a notice about the study on course Web sites. All courses were verified as being taught completely via the Web. Fourteen instructors agreed to allow their courses to be included in the study. Reasons for lack of participation varied; some instructors were conducting research of their own with their students, some instructors have a general policy of not allowing their students to be used in research studies, and some instructors refused without giving a reason.

For the fourteen courses where permission was granted, four were 100 level courses, two were 200 level courses, two were 300 level courses, two were 400 level courses, two were 500 level courses, and two were 600 level courses. These courses represented eight colleges throughout the university.

Findings and Discussion of Research Questions

This section provides an analysis of the data through both descriptive statistics and inferential statistics that answer the research questions posed in Chapter 1, and a discussion on the findings for each.

Research Question #1: What is the relationship of course structure with a learner’s satisfaction with perceived knowledge gained in a Web-based course?

The relationship between course structure and satisfaction with perceived knowledge gained in the conceptual model was derived from Moore’s proposed theory of transactional distance (Moore, 1991, 1993; Moore & Kearsley, 1996) and Guolla’s theory of learner satisfaction (Guolla, 1999). Course structure scores were determined with a
rubric designed for this study to analyze course structure based on the course syllabi. The rubric consisted of twenty course components that the literature has shown to comprise course structure. Each component was scored on a scale of 1 (not present on the syllabus), 2 (present on the syllabus), and 3 (clearly explained on the syllabus). In addition, each component was scored for flexibility, that is, whether the student would have the flexibility to change the component to meet the student’s individual learning needs. Flexibility was scored as 1 (no indication of flexibility on the syllabus), 2 (some indication of flexibility on the syllabus), and 3 (flexibility clearly explained on the syllabus).

The mean course structure score was 58.77 (S.D. = 2.38). The minimum score was 52 and the maximum score was 77.33, which indicates a positively skewed distribution. The majority of courses had a low level of overall course structure, which included low levels of dialogue and low levels of flexibility for the individual learner. Overall the students in this study were moderately satisfied with the structure of their courses (Mean = 5.05, S.D. = 1.5) and with the interactions in their courses (Mean = 4.7, S.D. = 1.45).

Discussion on Course Structure

The scores indicate that learners in these courses had little course structure to support them as they learned new information, low levels of interactions with their instructors, their peers and the course content. In addition, the scores indicated virtually no flexibility to make the course materials and exercises more relevant to their learning.
needs in the fourteen courses included in this study. Yet, these students were generally satisfied with course structure in this study.

Per Moore’s proposed theory then, students enrolled in these courses would have to have much higher levels of learner autonomy to compensate for the low levels of interaction and the inflexibility of the course structure and successfully learn the course material (Moore, 1991, 1993; Moore & Kearsley, 1996). Based on his proposed theory, these low structure scores should also lead to lower levels of satisfaction with perceived knowledge gained in the course. That is, if the course structure was inflexible, and the interactions were low, there should be higher transactional distance resulting in greater potential for misunderstanding of the course materials yielding lower levels of satisfaction with perceived knowledge gained in the course. Self-regulated learning theory suggests that if the ability to self-regulate learning is high, satisfaction with course structure or course interactions would not impact satisfaction with perceived learning in the course as the additional support course structure and interactions provide would not be needed by these self-regulating learners.

The conceptual model proposed for this study would suggest that if the learners are very autonomous, the level of structure in the courses would have less effect on overall satisfaction with perceived knowledge gained. In order to determine whether the model accurately explained the relationship, the dependent variable of satisfaction with perceived knowledge gained was also examined. The results for the dependent variable and its relationship to course structure are discussed in the next section.
Satisfaction with Perceived Knowledge Gained

The students completed the Satisfaction Questionnaire which consists of nine items and is scored using a Likert-type scale of 1 (Inadequate/Very Dissatisfied) to 7 (Adequate/Very Satisfied). The instrument consists of three subscales, each of which are summed and averaged to determine the scores for satisfaction with course interaction (items 1-4), satisfaction with course structure (items 5-7, and overall satisfaction with perceived knowledge gained in the course (items 8-9). For this study, the satisfaction with perceived knowledge gained subscale was utilized as the score for the dependent variable. The mean for satisfaction with perceived knowledge gained in a Web-based course was 5.09 (S.D. = 1.29). The minimum score was 1 and the maximum score was 7. The results are displayed in Table 8 in Appendix C.

Discussion of Satisfaction with Perceived Knowledge Gained

Overall participants reported moderate satisfaction with their perceived knowledge gained in their courses. Per the conceptual model of this study, this should be related to learner autonomy and to some degree, related to the course structure of the student’s courses. It was this proposed relationship that led to research question 1: What is the relationship of course structure with learner’s satisfaction with perceived knowledge gained in a Web-based course?

The Relationship between Course Structure and Satisfaction with Perceived Knowledge Gained

In examining the relationship between the course structure scores obtained in this study and the scores obtained on satisfaction with perceived knowledge gained, no
statistically significant relationship was found ($r = .044$, $p = .723$). The mean score for satisfaction with perceived knowledge gained was 5.09 ($S.D. = 1.29$) on a scale of 1 (very dissatisfied) to 7 (very satisfied), indicating a positively skewed distribution. The results of this study indicate that there is no significant relationship between the specific structural components of the course and the learner’s satisfaction with what they believe they have learned. There are several possible reasons for this finding, which are discussed in the next section.

Discussion of the Relationship between Course Structure and Satisfaction with Perceived Knowledge Gained

This was an exploratory study using a new instrument to define and score course structure. Consequently, this finding could be a result of the methodology used to develop the rubric to measure course structure, as the instrument may not include the appropriate items, or the scoring may not be sensitive enough to accurately measure course structure. It is also possible that satisfaction with perceived knowledge gained is not an appropriate proxy for transactional distance or that the lack of variance in the course structure scores led to the finding of no relationship between course structure and satisfaction with perceived knowledge gained.

Another potential explanation is that the learners in this study had the ability to adequately regulate their own learning, and therefore, the course structure did not influence their perceived knowledge gained as is suggested in the conceptual model of learning in a Web-based course presented in this study. This explanation would be supported by self-regulated learning theories which state that as learners develop the
ability to set their own goals, monitor their own progress, and evaluate their own progress; the structure provided by course instructors becomes less important (Corno & Boekaerts, 2005; Winne, 1995; Zimmerman, 1989, 2000). Research question two developed from the conceptual model’s proposed relationships between learner autonomy and satisfaction with perceived knowledge gained.

Research Question #2: What is the relationship of learner autonomy with learner’s satisfaction with perceived knowledge gained in a Web-based course?

Learner Autonomy

The conceptual model for learning in a Web-based course was informed by Moore’s proposed theory of transactional distance (Moore, 1991, 1993) and Zimmerman’s socio-cognitive theory of self regulated learning (Zimmerman, 1989, 2000). Within the model, the ability to be an autonomous learner directly affects the level of course structure required to obtain satisfaction with perceived knowledge gained in a Web-based course. Learner autonomy for this study was measured using the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, et al., 1991). This instrument consists of 81 items answered on a seven point Likert-type scale where 1 indicates “not at all true of me” and 7 indicates “very true of me.”

This instrument measures motivation, self-efficacy, cognitive strategies, goal orientations, test anxiety, rehearsal strategies, elaboration strategies, critical thinking, organization, time and environment control, effort regulation, peer learning, help seeking, control of learning beliefs, and metacognition of self regulation for the given course context and was therefore an appropriate instrument to measure learner autonomy.
The mean score on the instrument was 4.22 (S.D. = 0.78). The minimum score was 1.93 and the maximum score was 6.32, which indicates a positively skewed distribution. Overall, this group of students had moderate abilities to self-regulate learning in their course.

Discussion on Learner Autonomy

The overall ability to self-regulate among these learners is not surprising given that nearly 78% of the participants in the study reported junior and senior class rankings. Students at that level would be expected to have a greater ability to regulate their learning in a college course (Corno & Boekaerts, 2005; Zimmerman, 2000). Per the conceptual model of learning in a Web-based course, these autonomy scores indicate an ability to self-regulate learning and reduce reliance on course structure to obtain satisfaction with their perceived knowledge gained in their Web courses. Therefore, there should be a positive relationship between the learner autonomy scores and the level of satisfaction with perceived knowledge gained. This relationship was explored in research question 2:

What is the relationship of learner autonomy with learner’s satisfaction with perceived knowledge gained in a Web-based course?

Relationship between Learner Autonomy and Satisfaction with Perceived Knowledge Gained

The correlation coefficient between the MSLQ score and overall satisfaction with perceived knowledge gained in a Web-based course was \( r = .361 \) (\( p = .002 \)) which
indicates that there is a positive moderate statistical relationship between learner autonomy and satisfaction with perceived knowledge gained. The results are displayed in Table 9 in Appendix C.

Discussion

Overall the students in this study had moderate abilities to self-regulate their learning in their course and, as indicated in the section on research question 1, these students were also moderately satisfied with their perceived knowledge gained in their Web courses.

The relationship between the two however, is moderate, indicating that there are other variables that also impact satisfaction with perceived knowledge gained. Since course structure was not related to the dependent variable, other variables need to be explored in future studies. This does not necessarily mean that course structure is not one of the variables that impacts satisfaction with knowledge gained. In this study, it is possible that the relatively high ability of the participants to self-regulate their learning may have negated the effect of course structure. That is, these students may not have needed the additional support of course structure at a significant level. This idea is supported by the high levels of computer technology experience that these student participants reported. Research question three examined whether there was any direct relationship between computer technology experience and satisfaction with perceived knowledge gained in a Web-based course.
Research Question #3: What is the relationship between a learner’s experience with computer technology and learner’s satisfaction with perceived knowledge gained in a Web-based course?

Early studies on Web-based instruction indicated that the inability to utilize technologies interfered with the ability to successfully complete Web-based courses (Campbell-Coggins, 1995). As more and more adults became familiar with various computer technologies, later studies indicated mixed results. Among the studies that indicate there is a relationship, the findings were that self-efficacy for computer tasks was related to course grades or intent to take additional Web courses (Joo, et al., 2000; Lim, 2001). Self-regulated learning theorists have supported the idea that self-efficacy for course tasks impacts a learner’s ability to successfully learn course materials (Hargis, 2000; Zimmerman, 1995). Therefore, the conceptual model of learning in a Web-based course suggests that computer technology experience moderates the variable of learner autonomy. However, in order to test the proposed model, the potential relationship between computer technology experience and satisfaction with perceived knowledge gained must also be examined.

The participants in this study had extensive computer experience (Mean = 11.07, S.D. = 3.1) and Internet experience (Mean = 8.23, S.D., 2.3). Computer technology experience scores were determined through a self-report subscale on the Learner Profile Questionnaire. This fifteen item scale asks participants to rate their computer experience on a Likert-type scale from 1 (no experience) to 7 (very experienced, could or have taught others) on a variety of computer and Internet technologies. The reliability coefficient for the scale in this study was a = .904. The mean score on computer
technology experience was 5.66 (S.D. = .996). The minimum score was 3 and the maximum score was 7 indicating a positively skewed distribution.

Discussion of Computer Technology Experience

The participants in this study had moderately high levels of computer technology experience. Per the conceptual model of learning in a Web-based course, this should impact the participants’ self-efficacy for the computer and Internet tasks required in Web courses, and should therefore be related to the participants’ level of autonomy and indirectly, the participants’ overall satisfaction with perceived knowledge gained. Research question three was developed to examine whether there was a direct relationship between computer technology experience and satisfaction with perceived knowledge gained.

Relationship between Computer Technology Experience and Satisfaction with Perceived Knowledge Gained

To answer research question three, the correlation coefficient between computer technology experience and overall satisfaction with perceived knowledge gained was calculated. The result (r = .089; p= .464) indicates that there is no statistically significant relationship between computer technology experience and overall satisfaction with perceived knowledge gained in this study. The results are displayed in Table 10 located in Appendix C.
Discussion of Relationship between Computer Technology Experience and Satisfaction with Perceived Knowledge Gained

Based on the conceptual model of learning in Web-based courses, there should not be a relationship between computer technology experience and satisfaction with perceived knowledge gained. Rather, the model proposes that there should be a relationship between computer technology experience and learner autonomy, indicating that self-efficacy for computer technology tasks increases self-efficacy for learning in the course. The high scores on computer technology experience would lend credence to the idea that self-efficacy played a role in the finding that there is a relationship between learner autonomy and satisfaction with perceived knowledge gained, but that course structure was not significantly required for this group of students. Research question four explores whether there is a significant relationship between learner autonomy and computer technology experience.

Research Question #4: What are the inter-item relationships between course structure, learner autonomy, computer technology experience, and satisfaction with perceived knowledge gained in a Web-based course?

Because the intent of this exploratory study was to determine whether the linear combination of a particular set of independent variables could explain satisfaction with perceived knowledge gained, the relationships between all variables had to be examined to determine whether there was support for the linear regression model. An inter-item correlation matrix was constructed consisting of all variables. Only two significant relationships were identified. Learner autonomy, as measured by the Motivated
Strategies for Learning Questionnaire (Pintrich, et al., 1991) was related to satisfaction with perceived knowledge gained ($r = .361$, $p = .002$). In addition, computer technology experience was related to learner autonomy ($r = .393$, $p = .001$). The results are displayed in Table 12.

<table>
<thead>
<tr>
<th></th>
<th>Satisfaction with Knowledge Gained in Course</th>
<th>Computer Technology Experience</th>
<th>Course Structure Score</th>
<th>MSLQ</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Satisfaction with Knowledge Gained in Course</strong></td>
<td>Pearson Correlation 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.089</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Computer Technology Experience</strong></td>
<td>Pearson Correlation .089</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.464</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>70</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course Structure Score</strong></td>
<td>Pearson Correlation -.044</td>
<td>.144</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.723</td>
<td>.240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>68</td>
<td>68</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td><strong>MSLQ</strong></td>
<td>Pearson Correlation .361(**)</td>
<td>.393(**)</td>
<td>-.200</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.002</td>
<td>.001</td>
<td>.101</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>70</td>
<td>70</td>
<td>68</td>
<td>70</td>
</tr>
</tbody>
</table>

Table 12. Correlation Matrix of All Variables (Note: ** Correlation is significant at the 0.01 level (2-tailed).
Discussion on Relationships of All Variables

As would be expected based on the proposed conceptual model of learning in a Web-based course, there is a relationship between computer technology experience and learner autonomy as measured by the MSLQ. This lends further support to the argument that self-efficacy for specific tasks increases overall self-efficacy for success in a Web course. In addition, the relationship between autonomy and satisfaction with perceived knowledge gained indicates support for the proposed model of learning in Web courses. That is, in these courses where structure, flexibility and interactions were low, the students’ ability to function autonomously was significantly related to satisfaction with what these students reported was learned in their courses. However, there was only one significant relationship between an independent variable and the dependent variable. Reasons for the lack of other significant relationships were suggested in the preceding sections. The next section examines the question of a potential linear relationship among the variables.

Research Question #5: Which independent variables explain and predict the greatest amount of variance in the level of learner’s satisfaction with perceived knowledge gained in a Web-based course?

In order to explain the variance in the dependent variable of satisfaction with perceived knowledge gained, the dependent variable would be regressed onto the independent variables of computer technology experience, course structure and learner autonomy using a hierarchical entry so that the potentially moderating variable of computer technology experience would be entered first to eliminate any variance not
explained by the primary independent variables. Course structure would be entered next, as this is a course level variable, and finally, learner autonomy would be entered last as this is an individual level variable.

However, a review of the correlation matrix indicated there was only one statistically significant relationship between an independent variable and the dependent variable. Only learner autonomy had a statistically significant relationship with satisfaction with perceived knowledge gained. Therefore, this set of independent variables was not sufficient to obtain a regression model in this study, and the regression analysis was not conducted.

Discussion

That the analysis indicated that only one of the independent variables reached a significant relationship with the dependent variable does not necessarily discount the proposed model of learning in Web courses. This particular sample included learners with high levels of computer technology experience and an above average ability to regulate their own learning in the courses included in the study. Course structure may not have been needed to a significant degree by these students in order to successfully learn what they wanted and needed to learn in these courses. Thus, for a different group of learners, course structure might be included in the model.
CHAPTER 5
SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Learning at a distance is the fastest growing segment of adult education in the United States (Derrick, 2003). The majority of these adult distance learners are enrolling in formal undergraduate and graduate programs (Derrick, 2003; Palloff & Pratt, 1999). There has, however, been relatively little investigation into the pedagogy of learning in Web environments, and there are few theories of online pedagogy (Garrison, 2000). The few studies on learning in Web courses indicate that many learners are not able to adapt to Web learning environments as they lack the required learning skills (Hartley, 2001; Song, 2002). However, the flexibility that Web courses offer busy adults provides an opportunity to pursue lifelong learning that would not otherwise exist (Derrick, 2003). These two conditions – increasing use of Web courses and the lack of required learning skills in Web environments – create a necessity for increasing our understanding of how learning takes place in Web courses.

One of the few pedagogical theories of distance learning (Garrison, 2000), Moore’s proposed theory of transactional distance, has received some examination with mixed results. Of the studies utilizing Moore’s proposed theory as a conceptual scheme, most have focused on the construct of dialogue as the primary variable affecting learning outcomes (Chen, 2001a; Chen 2001b; Gunawardena, 1999; Hirumi, 2002; Stein & Wheaton, 2002). Fewer studies have examined the structure construct of Moore’s
proposed theory (Kanuka, 2001; Saba, 1988; Saba & Scheerer, 1994; Stein & Wheaton, 2002). Dialogue, or interaction, was described by Moore (1993) as planned into the course, while structure was described as the degree to which the course components can be flexible in meeting individual student needs. As a result this study included a measure of planned dialogue and course flexibility in the scores assigned for course structure. Moore (1991, 1993) also postulates that if there is little flexibility in the course structure, and if interactions are few, the learner will have to be more autonomous in order to reduce transactional distance. However, very few studies have examined learner autonomy in distance learning from Moore’s conceptual framework (Chen & Willits, 1999; Huang, 2002). There has, however, been some investigation done on self-regulation in Web courses (Azevedo et al., 2004; Hargis, 2000).

Zimmerman and LeBeau (2000) equate socio-cognitive self-regulated learning theory with self-directed learning and autonomy. Self-regulated learning theories suggests that if learners are motivated, able to set their own goals, able to select appropriate cognitive strategies, able to monitor their own progress, and able to evaluate their success, learning is more likely to occur (Zimmerman, 1989, 2000; Winne, 1995; Corno & Boekaerts, 2005). Thus, if students have these self-regulating abilities, they would still be able to learn in Web courses where interactions are sometimes limited, and there is often little flexibility in course requirements.

Utilizing constructs from Moore’s (1991, 1993) proposed theory of transactional distance and Zimmerman’s socio-cognitive self-regulated learning theory (1989, 2000), a conceptual model of learning in a Web-based course was proposed. The model suggests that the learner’s autonomy level influences the level of course structure required in the
Web course in order for the learner to feel that they learned what they wanted and needed to learn in the course. In this study learner autonomy was a measure of the ability to self-regulate in a Web course, course structure was a score assigned by three independent raters using a rubric developed to analyze the course syllabi for twenty components of structure, and the learner’s perceptions of their satisfaction with their learning was measured using a satisfaction scale.

One other variable was added to the study and to the model as a potentially modifying independent variable. Early studies of learning on the Web indicated that new computer and Internet technologies interfered with the ability to learn, and often resulted in high drop out rates among Web learners (Campbell-Gibson, 1995; Howard, 1986). However, more recent studies have shown mixed results regarding computer and Internet skills (Ford & Chen, 2000; Stein & Wheaton, 2002). While these studies examining the direct impact of computer skills on learning outcomes in Web courses found mixed results, there is research in self-regulated learning that indicates that computer and Internet skills do influence the ability to self-regulate learning in Web courses (Azevedo, et al, 2004; Lim, 2001; Joo, et al., 2000). That is, having high computer technology experience may allow a learner to be more autonomous in learning on the Web. Consequently, computer technology experience was added to the conceptual model examined in this study.

The purpose of this study was to examine relationships between a set of independent variables: (a) course structure; (b) learner autonomy; and (c) computer technology experience, and the dependent variable of satisfaction with perceived knowledge gained. A conceptual model of learning in Web-based courses was proposed
and the proposed linear relationship of the three independent variables and the dependent variable was examined to determine whether the proposed model of learning in Web courses was supported in this investigation.

The model illustrates the proposed relationships of the independent variables of autonomy (AS), structure (CSS), the potentially moderating variable of computer technology experience (CTE) and the dependent variable of satisfaction with perceived knowledge gained in a Web course (SKG). Autonomy is the top level in the model, and may be moderated by computer technology experience. Autonomy is proposed to affect the level of course structure required by the learner at the next level. The combination of the learner’s autonomy level and the course structure level explain the learner’s satisfaction with perceived knowledge gained. Thus, the model was depicted as:

![Model Diagram]

Research questions were posed based on the suggested relationships within the conceptual model of learning in Web courses. The questions investigated in this study were:
1. What is the relationship of course structure with a learner’s satisfaction with perceived knowledge gained in Web-based courses?

2. What is the relationship of learner autonomy with a learner’s satisfaction with perceived knowledge gained in Web-based courses?

3. What is the relationship between a learner’s experience with computer technology and a learner’s satisfaction with perceived knowledge gained in Web-based courses?

4. What are the inter-item relationships between course structure, learner autonomy, computer technology experience, and satisfaction with perceived knowledge gained in a Web-based course?

5. Which independent variables explain and predict the greatest amount of variance in the level of a learner’s satisfaction with perceived knowledge gained in a Web-based course?

In order to answer these research questions 240 undergraduate students over the age of eighteen enrolled in Web courses at a large Midwestern university winter quarter 2005 were randomly selected for participation. Sixty eight students from this random sample completed the two online questionnaires; one at the beginning of the quarter on their ability to self-regulate their learning in their current Web course (level of autonomy), their computer technology experience, and limited personal information, and a second at the end of the quarter on their satisfaction with their perceived learning. For the sixty eight students who responded, courses were identified and syllabi were collected and scored by three independent instructional designers on twenty components of course structure using a rubric developed for this study.
The data collected on these students and courses were analyzed using both descriptive and inferential statistics. A linear regression analysis was planned, but not conducted based on the findings of the correlation matrix of all variables in the study.

This chapter is divided into five sections: (a) summary of findings and discussions for each research question, (b) conclusions on the proposed conceptual model, (c) implications, (d) limitations, and (e) recommendations for future research.

Summary of Findings and Discussion

Course Structure

The finding for research question 1 (What is the relationship of course structure with learner’s satisfaction with perceived knowledge gained in a Web-based course?) is that there is no statistically significant relationship between course structure and satisfaction with perceived knowledge gained in a Web-based course in this study. In examining the relationship between course structure and satisfaction with perceived knowledge gained, no statistically significant relationship was found ($r = .044$, $p = .723$).

Overall, the 14 courses included in the study had low structure scores ($Mean = 58.77$, $S.D. = 2.38$), few interactions, and extremely limited flexibility for learners to make their learning more relevant to their own needs. The students in this study also indicated that overall they were moderately satisfied with their perceived knowledge gained in their courses and that they were moderately satisfied with the course structure. This could indicate that since structure was low, the students were able to function at a level of autonomy to compensate for the low structure.
The low structure scores may have contributed the inability to detect a statistically significant relationship between course structure and satisfaction with perceived knowledge gained. The low structure scores do not necessarily indicate that the proposed model of learning in a Web course is incorrect. Rather, the conceptual model of learning in a Web course would indicate that if course structure is low (inflexible with few planned interactions), the learners may have been more autonomous, resulting in moderate satisfaction with their perceived learning.

Learner Autonomy

The finding for research question 2 (What is the relationship of learner autonomy with learner’s satisfaction with perceived knowledge gained in a Web-based course?) was that there is a moderate positive relationship between learner autonomy and satisfaction with perceived knowledge gained ($r = .361; p = .002$) in this study. The learners in this study had moderate abilities to self-regulate their learning in their courses (Mean = 4.22; S.D. = 0.78). The finding that this group of students was able to self-regulate their learning was not surprising given that nearly 78% of them reported that they held junior and senior class rankings, and self-regulation learning theories indicate that students learn self-regulation behaviors through schooling and observation of the modeling provided by others (Corno & Boekaerts, 2005; Zimmerman, 2000). The ability to function autonomously in a Web course should, according to the proposed model of learning in a Web course, have had a relationship with the learner’s satisfaction with their perceived learning in their course.
Computer Technology Experience

The results of analysis for research question three (What is the relationship between a learner’s experience with computer technology and learner’s satisfaction with perceived knowledge gained in a Web-based course?) indicated that there is no statistically significant relationship between computer technology experience ($r = .089$, $p = .464$) and satisfaction with perceived knowledge gained in this study. The majority of students in this study reported that they had above average computer technology experience (Mean = 5.66; S.D. = .996).

The conceptual model of learning in a Web course suggests that computer technology experience affects the learner’s ability to be autonomous in a Web course, thus, the model suggests that there is no direct relationship between computer technology experience and satisfaction with perceived knowledge gained.

Relationships between All Variables

The findings for research question 4 (What are the inter-item relationships between course structure, learner autonomy, computer technology experience, and satisfaction with perceived knowledge gained in a Web-based course?) are that there is a positive moderate relationship between computer technology experience and learner autonomy ($r = .393$, $p = .001$) and, as stated above, a positive moderate relationship between learner autonomy and satisfaction with perceived knowledge gained ($r = .361$, $p = .002$). No other significant relationships were found. As a result, there is no linear relationship between the variables in this study.
The conceptual model proposed in this study suggests the two relationships that were found, however, the expected relationship between course structure and satisfaction with knowledge gained was not found. This failure to identify a statistically significant relationship could be a result of the instrument used to measure course structure, or it could indicate that course structure, as defined in this study, is not a component of learning in Web courses.

The Linear Relationship of Variables in the Study

The proposed model of learning in Web courses suggested that the independent variables of course structure and learner autonomy would create a linear combination that could explain the variance in the dependent variable of satisfaction with perceived knowledge gained. Research question 5 (Which independent variables explain and predict the greatest amount of variance in the level of learner’s satisfaction with perceived knowledge gained in a Web-based course?) was not explored as the results for question 4 indicated that there would be no linear relationship of the variables in this study. However, this does not necessarily negate the proposed model of learning in Web courses as the measure of course structure may not have been adequate and the student participants had fairly high autonomy, which may have lessened the need for structure in order to learn in these Web courses.
Conclusions

This study proposed a conceptual model of learning satisfaction in Web-based courses. Based on constructs from Moore’s proposed theory of transactional distance (1991, 1993) and Zimmerman’s theory of self-regulated learning (1989, 2000), the model proposed that learner autonomy would be moderated by the learner’s level of computer technology experience (CTE), and that the linear combination of the learner’s autonomy score (AS) and the level of course structure (CSS) would explain the variance in a student’s overall satisfaction with perceived knowledge gained in their Web-based courses (SKG). Thus, the conceptual model was proposed as:

![Conceptual Model of Learning in a Web Course](image)

Figure 1. Conceptual Model of Learning in a Web Course

The findings for the research questions and an examination of the proposed conceptual model in light of the research findings lead to several conclusions. First, learner autonomy appears to be more about the self-regulatory skills that learners have to apply to learning in Web courses, than it is about learners wanting to make the learning
more relevant to their personal learning needs. In the past, distance education researchers suggested that autonomous learners would want distance courses to offer flexibility so that the content and tasks centered on the individual learner’s immediate learning needs (Moore, 1991, 1993). In this study, there was virtually no flexibility in any of the Web courses; however, the students reported that they had moderate to high satisfaction with their learning and that they were satisfied with the structure in these courses. These same students had moderate abilities to self-regulate their learning, and there was a significant relationship found between learner autonomy as measured on a self-regulated learning instrument and satisfaction with perceived learning. Consequently, it is likely that it is the ability to self-regulate in the course, rather than the desire to make the course more pertinent to immediate needs that effects perceived learning.

Second, computer technology experience moderates learner autonomy. The literature on self-regulation examined in this study indicates that confidence in the ability to perform computer and Internet tasks in general increases the learner’s confidence in their ability to perform these tasks in Web courses (Joo, et al. 2000; Lim, 2001). This increased confidence in the ability to perform necessary course tasks is a component of self-regulated learning, or learner autonomy. Thus, increasing the computer and Internet skills of learners increases their ability to be autonomous in Web courses.

Third, course structure does not seem to effect satisfaction with perceived knowledge gained. It may be that this is true only when the learners have high enough abilities to self-regulate their learning in low structure situations, or it may be that course structure is not significant in satisfaction with learning in Web courses. In this study,
satisfaction with learning was not effected by the course structure; however the learners did have moderate abilities to self-regulate learning in these courses.

Finally, the proposed pathway in the conceptual model was not supported by the data in the study. The dependent variable of satisfaction with perceived knowledge gained in a Web course was not related to the course structure scores, indicating that course structure should be removed from the pathway in the conceptual model of learning in Web courses.

The proposed model and pathway was illustrated as:

In the proposed pathway, computer technology experience was expected to moderate the autonomy score. The findings indicated that there is a significant relationship between these two variables. The autonomy score, or score on the Motivated Strategies for Learning Questionnaire (Pintrich, et al., 1991), was expected to determine the level of course structure required by the learner and the combination of autonomy and course structure were expected to explain the variance in satisfaction with learning in Web
courses. As can be seen in the model above, course structure did not reach a significant level in the model, and therefore the role of course structure in the model is revised so that rather than functioning as an independent variable, course structure functions within the model as a mediating variable. This changed the fundamental understanding of the role of course structure in the conceptual model. Mediating variables transmit the effects of another variable. In this case, the findings of the study suggest that course structure may transmit the effects of another variable - learner autonomy - resulting in the level of satisfaction with perceived knowledge gained in Web courses. Thus, the path of the conceptual model has not changed, however our understanding of the role of course structure has changed from that of an independent variable with a direct effect on satisfaction with learning to one of a mediating variable that transmits the effect of learner autonomy on satisfaction with perceived learning.

Implications and Recommendations

This exploratory study represents an initial attempt to examine a model of learning in a Web course. The model integrates constructs from Moore’s proposed theory of transactional distance (1991, 1993) and Zimmerman’s socio-cognitive self-regulated learning theory (1989, 2000) in formal Web-based courses. It goes beyond previous studies by: 1) measuring the overall structure of the courses, including the planned interactions and the degree of flexibility on each component of course structure, and the course environment and medium, 2) measuring learner autonomy and including
autonomy in the overall model, and 3) examining the degree of satisfaction with learning that participants had in their courses.

For practitioners, this study suggests that the ability to be autonomous, that is to self-regulate learning in a Web course, is significant in overall satisfaction with what students believe they have learned. The findings of this study indicate that the courses provided low levels of structure, flexibility, and interaction for the learners. In addition, these courses provided little, if any modeling of the self-regulating behaviors required to learn the course material. Based on these findings it appears that Web teachers require further professional development on how to provide adequate structure, flexibility and interactions in their Web courses for those students who may lack the level of autonomy required to learn the course material. In addition, Web instructors need to develop the ability to teach and model self-regulatory behaviors. Institutions offering Web courses need to provide development for their Web instructors on presenting and modeling these self-regulatory skills.

The professional development offered to these Web instructors should also include information to help instructors gain a better understanding of the developmental processes their students experience as they become more self-regulating in their courses, and how, as instructors, they can support these processes. Socio-cognitive self-regulated learning theory (Zimmerman, 1989, 2000) suggests that instructors should begin with higher levels of structure for lower level courses and new learners, moving to lower structure as students become more expert in the area of study. In this study, the majority of the students were enrolled in low level courses; however all levels of courses had low levels of structure. Instructors of these lower level courses should also model behaviors
that are known to lead to successful learning in Web courses and should provide appropriate guidelines for useful cognitive strategies for the course.

The conceptual model proposed and examined in this study combined a proposed theory of distance learning with socio-cognitive self-regulated learning theory to offer an explanation of how learning in Web courses might occur. Although previous studies indicated that course structure effects satisfaction with perceived learning in Web courses (Kanuka, 2001; Saba & Schearer, 1994; Stein & Wheaton, 2002), for the learners in this study, course structure had no statistically significant relationship with perceived learning. Thus, research on learning in Web courses needs to include the examination of the components of self-regulation that have the greatest impact on satisfaction with learning. Further, the study of learning in Web environments needs to examine how the use of self-regulatory skills differs in Web courses and face-to-face courses. While it has been shown that novel learning environments reduce the ability to self-regulate learning (Howard-Rose & Winne, 1993; Pintrich & DeGroot, 1990; Schunk, 2001; and Wolters, 2003) little research has been conducted on the impact of the Web environment and its influence on the ability to self-regulate learning; for these few studies the findings are mixed. Research on learning in Web environments needs to further examine the impact of the Web environment on the ability to self-regulate learning.

Limitations

Several limitations of the study must be noted. First, this study was conducted in a specific setting and while implications can be made, the results are not generalizable to
other settings and universities. Further testing of the model would be required to confirm these relationships in other settings.

Second, the independent variables were chosen to explain satisfaction with perceived knowledge gained in a Web-based course based on constructs from Moore’s proposed theory of transactional distance (1991, 1993) and Zimmerman’s socio-cognitive theory of self-regulated learning (1989, 2000). It is possible that other variables would reflect different results.

Fourth, all measures used for the independent variables were subjective in nature. The course structure rubric was scored by instructional designers, and a more objective measure of course structure needs to be developed. The Motivated Strategies for Learning Questionnaire is a self-report instrument, and provides a subjective view of the learner’s ability to self-regulate their learning at a specific point in time in a specific course. Future studies should develop a more objective measure for learner autonomy, and since autonomy is a developmental process, measures of learner autonomy need to be taken at more than one point during the course(s) under study. The satisfaction questionnaire is also a self-report instrument and is subjective in nature. A more objective measure of learning in Web courses is needed.

Directions for Future Research

Future studies should investigate other factors that may be related to satisfaction with perceived knowledge gained, utilize objective measures, and should consider multiple measures of learning outcomes. Course structure did not have a statistically significant relationship with the measure of learning outcomes utilized in this study;
however, this may have been due to problems with the instrument developed to measure course structure. Therefore, future studies need to further investigate the relationship of course structure and learning outcomes.

The model of learning in a Web-based course proposed in this study requires further research. Specifically, additional research is required on the development of the ability to self-regulate learning in Web-based courses, and the relationship of learner autonomy and learning outcomes in Web-based courses require further examination. The results of this study suggest that the model may be missing some important components, and these components need to be identified and added to the model. No statistically significant relationship between course structure and satisfaction with perceived knowledge gained was identified in this study, and further examination of course structure within the model is also required. The revised model indicates that course structure may be a mediating variable, and this relationship should be investigated.

Previous research indicates that adult learners are engaging in learning at a distance, and that most of these learners are enrolling in formal education programs. The research also suggests that many of these students do not have the skills required to succeed in a Web course environment. This study suggests that it is the lack of self-regulated learning skills, or the inability to function autonomously, which may lead to adults dropping out of courses, failing to enroll in subsequent courses, and overall dissatisfaction with learning in Web courses. Although further study is required to refine and expand the model of learning in Web courses, this study provides an exploratory inquiry into learner autonomy, course structure, computer technology experience and their relationships to learning in Web courses.
Previous research indicates that the ability to function autonomously in distance learning is crucial to learning outcomes and that the structure of a course determines the level of autonomy that a learner must be able to exercise in a course in order to achieve desired learning. This study partially supports these previous findings, suggesting that learners with greater abilities to self-regulate their learning in Web courses will be more satisfied with learning outcomes. This study also suggests that course structure does not directly effect learning in Web courses, but rather mediates learner autonomy, which does effect satisfaction with learning. Although further study is needed to expand and enhance these findings, this study offers an important reconceptualization of the constructs that effect learning in Web courses, and the types of skills required to gain satisfaction with Web learning. In addition, the study provides Web instructors with insight on the types of skills and behaviors that should be modeled for their Web learners.

Distance education research has focused on course structure and interactions that take place in Web course environments for some time now with mixed results. Perhaps distance education researchers should begin to consider how the structure and interaction variables relate to specific skills of learners. This study suggests that there is something fundamentally different about learning in Web courses, and that it is the specific skills of the students –their self-regulatory skills – that determine whether or not students are satisfied customers of distance courses.
REFERENCE


Ellis, T. J. (2001). Multimedia enhanced educational products as a tool to promote critical thinking in adult students. *Journal of Educational Multimedia and Hypermedia, 10* (2) 107-123.


110


APPENDIX A

CORRESPONDENCE
December 3, 2004

Office Address
Street Address
Columbus, Ohio 43210

Dear Professor (Name):

Thank you for agreeing to participate in my study examining learning in courses taught over the Web. As I mentioned, I need a signed consent form to satisfy Ohio State’s IRB requirements. Enclosed is the form for you to sign and a postage paid return envelope.

Some of the professors who agreed to participate in the study wanted to see the instruments that will be used to collect data from the students. Both are in the process of being placed online and although they are not yet functional forms, you can view the questions for both instruments at http://education.osu.edu/calvinj beginning Monday, December 6, 2004.

I will send you an email the first week of Winter Quarter reminding you that I will need your course syllabus as soon as possible.

Some of the professors who agreed to participate have also asked to see the results of the completed study, and I will be sending the results to all of you once the study is completed.

Thanks again for your assistance and have a great break!

Sincerely,

Jennifer Calvin
B. Instructor Consent Form

Participation Consent Form for Research Project: Explaining Learners’ Satisfaction with Perceived Knowledge Gained in Web-Based Courses through Course Structure and Learner Autonomy

I agree to provide my course syllabus to Jennifer Calvin for purposes of collecting data for her dissertation research Winter Quarter, 2005. I understand that my students’ participation is voluntary and that all student identification information will be kept confidential in the study and will be destroyed once the study is complete.

________________________________________  ________________________
(Signature)       (Date)
C. January Instructor Reminder Email

January 3, 2005

Dear Professor (Name):

Thanks again for agreeing to participate in my study on learning in Web-based courses. This is a reminder to send me your course syllabus as soon as possible.

If you have an interactive Web based syllabus, please provide a link to the syllabus or send me the complete file in an attachment.

Sincerely,

Jennifer Calvin
D. Instructor’s Course Announcement

This course is part of a study on learning in Web courses. As a student in this course, you may be selected to participate by filling out two online surveys. As a Web instructor I believe it is important research and I encourage you to participate if asked by the researcher. Her name is Jennifer Calvin and if chosen you will hear from her shortly after January 19.

Participation is voluntary. Your decision to participate or not will have no affect on your grade in this course.
E. Participant Email

Hi, my name is Jennifer Calvin and I am a graduate student here at Ohio State. I am conducting a research project that examines learning in Web-based courses. You have been selected to participate in the study. Participation is voluntary, however, if you complete both instruments – one now and one at the end of the quarter – you will be eligible for a random drawing for two $100.00 gift certificates to an online book/music store. The first survey that I am asking you to complete today is the Learner Profile and it will take you approximately 20-30 minutes to complete. Please answer the questions based on your first reaction. There are no right or wrong answers. The second survey will be posted the ninth week of the quarter and I will send you another email to let you know when to complete the Satisfaction Questionnaire. This second survey will take only 5 minutes to complete.

Please use this code to identify yourself when completing both surveys: A1234. The URL for the survey is http://education.osu.edu/calvinj. Your responses will be kept strictly confidential and will in no way impact your grade in your course. If you have any questions, you can contact me at calvin.15@osu.edu.

Thanks you so much for helping me with this study and good luck in the drawing!

Sincerely,

Jennifer Calvin
F. Participant Reminder Email for Learner Profile Questionnaire

Hi, I noticed that you have not yet completed the Learner Profile for the study on learning in Web courses. I know that you are very busy, but I wanted to ask you again to take the 20 minutes or so to complete this survey. If you complete this survey and the very short (5 minute) survey at the end of the quarter, you will be eligible for a drawing for one of two $100 gift certificates to an online music/book store.

Participation is voluntary, but it would really help those of us who are trying to provide good educational experiences to distance learners if you would take the few minutes required to complete the Learner Profile.

Your code for the survey is: A1234 and you can access the survey at http://education.osu.edu/calvinj.

Thanks!

Jennifer Calvin
G. Late Respondent Email

Dear (Name):

The quarter goes by quickly and like most students, you have no doubt been busy. Although the end of the quarter can be even busier, I am asking you to reconsider participating in my research project on learning in Web-Based courses. Participation is voluntary, however you would be helping instructors who provide distance courses on the Web figure out how to help you learn in your distance courses.

Both surveys are available online at http://education.osu.edu/calvinj. Your assigned code for the surveys is: A1234. Please enter this code on both surveys in the space provided. There are no right or wrong answers. The Learner Profile will take you approximately 20-30 minutes and the Satisfaction Survey will take only 5 minutes to complete.

By completing both surveys you will be eligible for a drawing for one of two $100 gift certificates to an online book/music store.

Thanks so much for helping me with this important project.

Sincerely,

Jennifer Calvin
A. Learner Profile Questionnaire

Section I. Demographics

1. Please enter your assigned 5 character code provided in the e-mail you received __________
2. What is the number of the course for which you are completing this questionnaire? __________
3. Sex? Female ☐ Male ☐
4. Age in years __________
5. What is your class standing at Ohio State? __________
6. Race __________
7. How many years have you used computers? __________
8. How many years have you been using the internet? __________

Below are several Internet-related activities. Please rate your experience with these activities using the following rating scale.

1 Have never performed this activity
2 Inexperienced, rarely perform this activity, still have much to learn
3 Somewhat experienced, occasionally perform this activity
4 Fairly experienced with this activity
5 Experienced, regularly perform this activity
6 Pretty experienced, have assisted others on some aspects of this activity
7 Very experienced, could/have taught others

Using the Internet

9. Typing or keying input through a computer keyboard: 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
10. Search the Web on a specific topic: 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
11. Use instant messaging (e.g., AOL Instant Messenger): 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
12. Download software from an online source: 1 2 3 4 5 6 7

13. Cut/paste online data or graphics into another program: 1 2 3 4 5 6 7

Using E-mail

14. Send and receive e-mail messages: 1 2 3 4 5 6 7

15. Forward an e-mail message: 1 2 3 4 5 6 7

16. Attach files to e-mail: 1 2 3 4 5 6 7

17. Use a variety of e-mail programs (Eudora, Outlook): 1 2 3 4 5 6 7

18. Set up and use email address lists: 1 2 3 4 5 6 7

19. Set up an email account: 1 2 3 4 5 6 7

Using Online Assistive Course Software (e.g. WebCT, Blackboard, E-Education, etc.)

20. Create a Web page: 1 2 3 4 5 6 7

21. Upload a document of any type to the course site: 1 2 3 4 5 6 7

22. Participate in threaded discussions: 1 2 3 4 5 6 7
23. Take online exams and quizzes: 1  2  3  4  5  6  7
Section II. Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia & McKeachie, 1991)

Part A. Motivation

The following questions ask about your motivation for and attitudes about this class. Remember there are no right or wrong answers; just answer as accurately as possible. Use the scale below to answer the questions. If you think the statement is very true of your, circle 7; if a statement is not at all true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

1  2  3  4  5  6  7
not at all               very true
true of me               of me

1. In a class like this, I prefer course material that Really challenges me so I can learn new things.

   1  2  3  4  5  6  7

2. If I study in appropriate ways, then I will be able to learn the material in the course.

   1  2  3  4  5  6  7

3. When I take a test I think about how poorly I am Doing compared to other students.

   1  2  3  4  5  6  7

4. I think I will be able to use what I learn in this course in other courses.

   1  2  3  4  5  6  7

5. I believe I will receive an excellent grade in this class.

   1  2  3  4  5  6  7

6. I’m certain I can understand the most difficult material presented in the readings for this course.

   1  2  3  4  5  6  7

7. Getting a good grade in this class is the most satisfying thing for me right now.

   1  2  3  4  5  6  7

8. When I take a test I think about items on other parts of the test I can’t answer.

   1  2  3  4  5  6  7
9. It is my own fault if I don’t learn the material in this course.

10. It is important for me to learn the course material in this class.

11. The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.

12. I’m confident I can learn the basic concepts taught in this course.

13. If I can, I want to get better grades in this class than most of the other students.

14. When I take tests I think of the consequences of failing.

15. I’m confident I can understand the most complex material presented by the instructor in this course.

16. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.

17. I am very interested in the content area of this course.

18. If I try hard enough, then I will understand the course material.

19. I have an uneasy, upset feeling when I take an exam.

20. I’m confident I can do an excellent job on the assignments and tests in this course.

21. I expect to do well in this class.

22. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.

23. I think the course material in this class is useful for me to learn.
24. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don’t guarantee a good grade.

25. If I don’t understand the course material, it is because I didn’t try hard enough.

26. I like the subject matter of this course.

27. Understanding the subject matter of this course is very important to me.

28. I feel my heart beating fast when I take an exam.

29. I’m certain I can master the skills being taught in this class.

30. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.

31. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.

Part B. Learning Strategies

The following questions ask you about your learning strategies and study skills for this class. Again, there are no right or wrong answers. Answer the questions about how you study in this class as accurately as possible. Use the same scale to answer the remaining questions. If you think the statement is very true of you, circle 7; if a statement is not at all true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

1 2 3 4 5 6 7
not at all true of me
very true of me

32. When I study the readings for this course, I outline the material to help me organize my thoughts.

33. During class time I often miss important points because I’m thinking of other things.

34. When studying for this course, I often try to explain the material to a classmate or friend.
35. I usually study in a place where I can concentrate on my course work.

36. When reading for this course, I make up questions to help focus my reading.

37. I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do.

38. I often find myself questioning things I hear or read in this course to decide if I find them convincing.

39. When I study for this class, I practice saying the material to myself over and over.

40. Even if I have trouble learning the material in this class, I try to do the work on my own, without help from anyone.

41. When I become confused about something I’m reading for this class, I go back and try to figure it out.

42. When I study for this course, I go through the readings and my class notes and try to find the most important ideas.

43. I make good use of my study time for this course.

44. If course readings are difficult to understand, I change the way I read the material.

45. I try to work with other students from this class to complete the course assignments.

46. When studying for this course, I read my class notes and the course readings over and over again.

47. When a theory, interpretation, or conclusion is presented in class or in the readings, I try to decide if there is good supporting evidence.

48. I work hard to do well in this class even if I don’t like what we are doing.
49. I make simple charts, diagrams, or tables to help me organize course material.

50. When studying for this course, I often set aside time to discuss course material with a group of students from the class.

51. I treat the course material as a starting point and try to develop my own ideas about it.

52. I find it hard to stick to a study schedule.

53. When I study for this class, I pull together information from different sources, such as lectures, readings and discussions.

54. Before I study new course material thoroughly, I often skim to see how it is organized.

55. I ask myself questions to make sure I understand the material I have been studying in class.

56. I try to change the way I study in order to fit the course requirements and the instructor’s teaching style.

57. I often find that I have been reading for this class but don’t know what it was all about.

58. I ask the instructor to clarify concepts I don’t understand well.

59. I memorize key words to remind me of important concepts in this class.

60. When course work is difficult, I either give up or only study the easy parts.

61. I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying for this course.

62. I try to relate ideas in this subject to those in other courses whenever possible.
63. When I study for this course, I go over my class notes and make an outline of important concepts.

64. When reading for this class, I try to relate the material to what I already know.

65. I have a regular place set aside for studying.

66. I try to play around with ideas of my own related to what I am learning in this course.

67. When I study for this course, I write brief summaries of the main ideas from the readings and my class notes.

68. When I can’t understand the material in this class I ask another student in this class for help.

69. I try to understand the material in this class by making connections between the readings and the concepts from the lecture.

70. I make sure that I keep up with the weekly readings and assignments for this course.

71. Whenever I read or hear an assertion or conclusion in this class, I think about possible alternatives.

72. I make lists of important items for this course and memorize the lists.

73. I attend this class regularly.

74. Even when course materials are dull and uninteresting, I manage to keep working until I finish.

75. I try to identify students in this class whom I can ask for help if necessary.

76. When studying for this course I try to determine which concepts I don’t understand well.

77. I often find that I don’t spend very much time on this course because of other activities.
78. When I study for this class, I set goals for myself in order to direct my activities in each study period.

79. If I get confused taking notes in class, I make sure I sort it out afterwards.

80. I rarely find time to review my notes or readings before an exam.

81. I try to apply ideas from course readings in other class activities such as lecture and discussion.
C. Satisfaction Questionnaire (Stein & Wheaton, 2002)

**Directions:** This survey is part of a study to examine factors that support learning in Web-based courses. Select a number along the continuum provided that best expresses your experience.

To submit the form once you have completed it, click on the SUBMIT button at the bottom of the form. If you accidentally submit the form before you have finished filling it out, click BACK on your browser to return to the form. Continue filling out the form and click submit once you have completed it.

Assigned 5 character code number.  

Information about the course you took:

Course Number  

Course grade you expect to receive  

---

Your satisfaction with distance learning:

Please estimate how adequate the course was in achieving each of the following goals

1. The level and type of personal dialog with the instructor.

   Inadequate ___________________________ Adequate
   
   ![](images/12345.png)

2. The level and type of dialog between you and other learners in your class.

   Inadequate ___________________________ Adequate
   
   ![](images/12345.png)

3. The level of sharing of ideas between you and the whole class.

   ![](images/12345.png)
4. The degree to which the instructor encouraged dialog, participation in class activities, and contact with others.

Inadequate

Adequate

5. The degree to which the instructor modeled learning strategies useful for learning course materials.

Inadequate

Adequate

6. The degree to which the instructor allowed you to customize your learning activities in the course to suit your interests or needs.

Inadequate

Adequate

7. To what extent were you satisfied with your involvement in course activities?

Very dissatisfied

Very satisfied

8. Satisfaction with the learning gained from the discussion groups or class teams/groups.

Very dissatisfied

Very satisfied

8. Satisfaction with the knowledge you gained from this course.

Very dissatisfied

Very satisfied
9. Satisfaction with the course structure (i.e., the activities, the assignments, and instructor guidance) in this course.

Very dissatisfied ____________________________ Very satisfied

1 2 3 4 5 6 7

When you are finished, please click on the Submit button below. Allow 10-15 seconds for the form to submit. You should see a Thank you message, which indicates that the form has been submitted successfully. Thank you again for helping me.
D. Course Structure Rubric

Course Structure Rubric

Course Number: ___________  Course Name: ___________
Instructor: _____________  Dept: _____________

<table>
<thead>
<tr>
<th>#</th>
<th>Structure Element</th>
<th>On Syllabus</th>
<th>Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Scores Assigned</strong></td>
<td>1 2 3</td>
<td>1 2 3</td>
</tr>
<tr>
<td>1.</td>
<td>Learning objectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Instructional goals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Content theme(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Presentation method(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Illustration(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Assignment(s)/project(s)/case study(ies)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Task Structures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Text structures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Instructor – learner interactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Learner-learner interactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Learner – content interactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Learner – medium/media interactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Learning theory employed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Student evaluation/assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Modeling/provision of learning strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Course environment/medium/media</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Work quality expectations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Attendance/participation expectations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Technical assistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Due dates</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Course Structure Score: 138
Instructions for completing the Course Structure Rubric

Assign two scores for each structural element under the appropriate heading.

The first score reflects the extent to which the course syllabus indicates the structural element. The scores assigned will be one of the following: 1 – not evident in the syllabus, 2 – evident in the syllabus, 3 – clearly explained in the syllabus. For example, if the syllabus makes no mention of technical assistance available for the student, element number 19 would be scored as a “1”. If the syllabus indicates that technical assistance is available, number 19 would be scored as a “2”. If the syllabus indicates that technical assistance is available, the hours it is available and how to contact help, number 19 would be scored as a “3.”

The second score reflects the extent to which the course syllabus indicates flexibility on the part of the instructor on the structural element. The scores assigned will be one of the following: 1 – not evident in the syllabus, 2 – evident in the syllabus, 3 – clearly explained in the syllabus. For example, if the syllabus makes no mention of the instructor’s willingness to consider a student’s desire to tailor an assignment to something they are particularly interested in, number 6 would be scored a “1” on flexibility. If the syllabus indicates in general that the instructor will discuss changes with individual students, number 6 would be scored a “2”. If the syllabus clearly states or encourages students to tailor assignments to match interests, work, or research interests, number 6 would be scored a “3”.

The following are descriptions to use as guides in scoring each course structure element.

1. Learning objectives. Does the syllabus indicate the learning objectives of the course? While most instructors do not include lengthy descriptions of objectives, can the student determine what they are supposed to learn from the course, or what skills they should develop in the course by reading the syllabus provided? Does the syllabus indicate flexibility on these objectives?

2. Instructional goals. Instructional goal structures refer to how the students are evaluated, usually categorized as independently, competitively, or collaboratively or by emphasizing mastery versus performance. Does the syllabus indicate how the instructional goal(s) are set up? Are the assignments graded individually or by group? Is the course graded on a normative curve or is grading criterion referenced? Are students asked to work together but graded individually? DO NOT score based on how the goals are set up; assign the score based solely on whether the syllabus makes the goal structure clear to the student. Does the syllabus indicate flexibility on the goal structures?

3. Content theme(s). Does the syllabus indicate the general content themes of the course? Is there more than one identified? Does the syllabus indicate any willingness to change or include other content themes indicating flexibility on the part of the instructor?
4. **Presentation method(s).** Does the syllabus indicate the teaching methods that will be used during the course? Are they implied (for example does the syllabus list “lecture” every Tuesday) well enough that they students will be able to identify what to expect from the instructor in the course? Is there any indication that the instructor would be willing to change teaching methods if asked?

5. **Illustration(s).** Does the syllabus indicate that there are any additional course materials that illustrate or further explain course materials? Is their purpose clear to the students? Is there any indication that the instructor would be willing to find additional materials if requested or to include materials brought in/generated by students?

6. **Assignment(s)/project(s)/case study (ies).** Does the syllabus indicate all assignments/projects/case studies that will be included in the course? How well are the assignments explained in the syllabus? Are they listed, but not explained? Can the student determine exactly what needs to be done? Is there any indication that the assignments/projects/cast studies can be tailored to the student’s interests or needs?

7. **Task structures.** Tasks may be part of assignments or may be done in class. They may indicate that students work collaboratively or independently. Do they have to be done in a specific sequence? Does the syllabus indicate specific tasks that are required, and are they explained clearly? Is there any indication of flexibility on these tasks?

8. **Text structures.** Text, especially online text, has an impact on how learners utilize it. Is there any indication in the syllabus of how the text is structured and how students are expected to utilize texts that are included? Is the text linear or can the student move through it in any order they want? Is there any indication of flexibility on text structures? For example, does the syllabus state that text is available both in printed and online formats?

While most courses include dialogue and interaction at some point, the next four items are to be scored based on whether the syllabus indicates that the interactions are PLANNED into the course.

9. **Instructor – learner interactions.** Does the syllabus indicate how and when the instructor and learner will interact? Is there scheduled chat time with the instructor? Scheduled discussion time with the instructor? Are phone calls encouraged or scheduled? Is there any indication of flexibility in the scheduled/structured interactions with the instructor?

10. **Learner-learner interactions.** Does the syllabus indicate how and when the learners will interact with each other? Is there scheduled chat time with groups? Scheduled synchronous or asynchronous discussions? Any other types of required/structured interactions among the learners, such as group project work time? Does the syllabus indicate any flexibility on these structured interactions?

11. **Learner – content interactions.** Does the syllabus indicate how and when the learners will interact with the course content? Individual projects or practice exercises? Are there links to additional/supporting information? Is there any indication of flexibility on when, how and what the learner interacts with?

12. **Learner – environment/medium (ia) interactions.**
13. **Learning theory employed.** Does the syllabus indicate the learning theory that is being utilized by the instructor? Would students understand whether they are expected to learn individually or collaboratively? Do the assignments, methods, assessments and goal structures indicate how the instructor views learning? Do they all align, or is there conflicting evidence on learning theory? Is there any indication of flexibility? *Although there is a general perception that a behaviorist learning theory would lead to a more structured course than say, a constructivist learning theory, DO NOT score based on any theory evident; assign the score based on whether the theory is evident in the syllabus and whether all other elements align with the theory.*

14. **Student evaluation/assessment.** How will the student be evaluated and assessed? Is it clear to the students from the syllabus? Does the syllabus indicate the grading scale? Does the syllabus indicate whether they will be graded individually or as a group on group projects? Who will conduct the assessment? Are there tests? Projects? Are the requirements for each clearly explained? Is there any indication that the instructor would be willing to consider other forms of assessment and evaluation?

15. **Modeling/provision of learning strategies.** Does the syllabus indicate if or how the instructor will model or provide information on learning strategies that would aid learning in the course? Are study guides available or something else that may provide additional explanation of course materials, suggestions for how to study/rehearse/connect course materials, self evaluation exercises, practice tests, etc.? Is there any indication to the student that the instructor would be willing to change any of these items?

16. **Course environment/medium/media.** Does the syllabus indicate the medium/media that course will employ and does it indicate the structure of the course environment? Is the course entirely online? Will they meet face-to-face part of the time? Will assignments be turned in electronically or on paper? Are the lessons carefully prescribed or can the students work through them at their own pace on their own time? For example, could a student complete all the lessons in two weeks if able, or does the instructor post one lesson per day/week? Is there any indication of flexibility on the course environment or medium?

17. **Work quality expectations.** Does the syllabus indicate the expectations of the instructor for the quality of work turned in? Is there any indication of flexibility on quality requirements?

18. **Attendance/participation expectations.** Does the syllabus indicate the attendance and participation expectations of the instructor? Are they tied to grading? Will the student be clear on how grades are affected by attendance and participation from the syllabus? Is there any indication of flexibility on these expectations?

19. **Technical assistance.** Does the syllabus indicate whether technical assistance is available? Does it indicate what assistance is available and when it is available? Does the syllabus indicate how to get the assistance? Is there any indication of flexibility on technical assistance?

20. **Due dates.** Does the syllabus indicate due dates for readings, assignments, projects, etc? Is there any indication of flexibility on these due dates?
<table>
<thead>
<tr>
<th></th>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>MSLQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances</td>
<td>.960</td>
<td>.331</td>
</tr>
<tr>
<td>Assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Technology Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances</td>
<td>1.28</td>
<td>.262</td>
</tr>
<tr>
<td>Assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with Perceived Knowledge Gained</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances</td>
<td>.321</td>
<td>.573</td>
</tr>
<tr>
<td>Assumed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. T-tests of early and late respondents on Learner Autonomy, Computer Technology Experience and Satisfaction with Perceived Knowledge Gained
<table>
<thead>
<tr>
<th></th>
<th>Emails sent</th>
<th>Completed Responses</th>
<th>Usable Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learner Profile</td>
<td>240</td>
<td>87</td>
<td>68</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>240</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Total Completing Both Instruments</td>
<td></td>
<td>70</td>
<td>68</td>
</tr>
</tbody>
</table>

Table 2. Response Rates

<table>
<thead>
<tr>
<th>Course</th>
<th>Rater #1</th>
<th>Rater #2</th>
<th>Rater #3</th>
<th>Average Structure Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59</td>
<td>62</td>
<td>58</td>
<td>59.67</td>
</tr>
<tr>
<td>2</td>
<td>54</td>
<td>50</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>3</td>
<td>52</td>
<td>58</td>
<td>59</td>
<td>56.33</td>
</tr>
<tr>
<td>4</td>
<td>52</td>
<td>49</td>
<td>55</td>
<td>52</td>
</tr>
<tr>
<td>5</td>
<td>74</td>
<td>79</td>
<td>79</td>
<td>77.33</td>
</tr>
<tr>
<td>6</td>
<td>55</td>
<td>63</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td>7</td>
<td>54</td>
<td>48</td>
<td>69</td>
<td>57</td>
</tr>
<tr>
<td>8</td>
<td>59</td>
<td>57</td>
<td>62</td>
<td>59.33</td>
</tr>
<tr>
<td>9</td>
<td>53</td>
<td>58</td>
<td>60</td>
<td>57</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
<td>52</td>
<td>69</td>
<td>57</td>
</tr>
<tr>
<td>11</td>
<td>56</td>
<td>67</td>
<td>68</td>
<td>63.67</td>
</tr>
<tr>
<td>12</td>
<td>49</td>
<td>57</td>
<td>63</td>
<td>56.33</td>
</tr>
</tbody>
</table>

Table 3. Course Structure Score
<table>
<thead>
<tr>
<th>Ages of Participants</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>2</td>
<td>2.9</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>20</td>
<td>15</td>
<td>21.4</td>
</tr>
<tr>
<td>21</td>
<td>18</td>
<td>25.7</td>
</tr>
<tr>
<td>22</td>
<td>14</td>
<td>20.0</td>
</tr>
<tr>
<td>23</td>
<td>6</td>
<td>8.6</td>
</tr>
<tr>
<td>24</td>
<td>2</td>
<td>2.9</td>
</tr>
<tr>
<td>26</td>
<td>2</td>
<td>2.9</td>
</tr>
<tr>
<td>27</td>
<td>3</td>
<td>4.3</td>
</tr>
<tr>
<td>28</td>
<td>2</td>
<td>2.9</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>31</td>
<td>2</td>
<td>2.9</td>
</tr>
<tr>
<td>39</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Table 4. Ages of Participants
<table>
<thead>
<tr>
<th>Race of Participants</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>5</td>
<td>7.1</td>
</tr>
<tr>
<td>Asian</td>
<td>3</td>
<td>4.3</td>
</tr>
<tr>
<td>Bi or Multi</td>
<td>5</td>
<td>7.1</td>
</tr>
<tr>
<td>Native American</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Pacific Islander or Alaskan Native</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>White</td>
<td>56</td>
<td>80.0</td>
</tr>
</tbody>
</table>

Table 5. Race of Participants

<table>
<thead>
<tr>
<th>Class Rank of Participants</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>5</td>
<td>7.1</td>
</tr>
<tr>
<td>Sophomore</td>
<td>10</td>
<td>14.3</td>
</tr>
<tr>
<td>Junior</td>
<td>20</td>
<td>28.6</td>
</tr>
<tr>
<td>Senior</td>
<td>34</td>
<td>48.6</td>
</tr>
<tr>
<td>Continuing Education</td>
<td>1</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Table 6. Class Rank of Participants
<table>
<thead>
<tr>
<th>Years of Computer Experience</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>7.1</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>11.4</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>4.3</td>
</tr>
<tr>
<td>10</td>
<td>18</td>
<td>25.7</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
<td>5.7</td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>12.9</td>
</tr>
<tr>
<td>13</td>
<td>7</td>
<td>10.0</td>
</tr>
<tr>
<td>14</td>
<td>4</td>
<td>5.7</td>
</tr>
<tr>
<td>15</td>
<td>6</td>
<td>8.6</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>2.9</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>1.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years of Internet Experience</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2</td>
<td>2.9</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>4.3</td>
</tr>
<tr>
<td>6</td>
<td>14</td>
<td>20.0</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>11.4</td>
</tr>
<tr>
<td>8</td>
<td>17</td>
<td>24.3</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>7.1</td>
</tr>
<tr>
<td>10</td>
<td>13</td>
<td>18.6</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
<td>2.9</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>5.7</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Table 7. Years of Computer and Internet Experience
<table>
<thead>
<tr>
<th>Course Structure Score</th>
<th>Pearson Correlation</th>
<th>Satisfaction with Perceived Knowledge Gained</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>-.044</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.723</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td></td>
<td>68</td>
</tr>
</tbody>
</table>

Table 8. Correlation Results for Course Structure and Satisfaction with Perceived Knowledge Gained

<table>
<thead>
<tr>
<th>MSLQ</th>
<th>Pearson Correlation</th>
<th>Satisfaction with Perceived Knowledge Gained</th>
<th>MSLQ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>.361**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>70</td>
<td>70</td>
</tr>
</tbody>
</table>

Table 9. Correlation Results for Learner Autonomy and Satisfaction with Perceived Knowledge Gained
### Table 10. Correlation Results for Computer Technology Experience and Satisfaction with Perceived Knowledge Gained

<table>
<thead>
<tr>
<th>Computer Technology Experience</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>.089</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>.464</td>
<td></td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Satisfaction with Knowledge Gained in Course</td>
<td>Computer Technology Experience</td>
<td>Course Structure Score</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------------------------------------</td>
<td>---------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td><strong>Satisfaction with Knowledge Gained in Course</strong></td>
<td>Pearson Correlation 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed) 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Computer Technology Experience</strong></td>
<td>Pearson Correlation .089</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed) .464</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course Structure Score</strong></td>
<td>Pearson Correlation -.044</td>
<td>.144</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed) .723</td>
<td>.240</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>N 68</td>
<td>68</td>
<td>68</td>
</tr>
<tr>
<td><strong>MSLQ</strong></td>
<td>Pearson Correlation .361(**)</td>
<td>.393(**)</td>
<td>-.200</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed) .002</td>
<td>.001</td>
<td>.101</td>
</tr>
<tr>
<td></td>
<td>N 70</td>
<td>70</td>
<td>68</td>
</tr>
</tbody>
</table>

(Note: ** Correlation is significant at the 0.01 level (2-tailed).

Table 11. Correlation Matrix

150