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RELATIONSHIPS BETWEEN LEARNING STYLES, DEMOGRAPHICS,
DELIVERY METHODS, STUDY TIMES AND TEST ACHIEVEMENTS OF
HOSPITALITY UNDERGRADUATES

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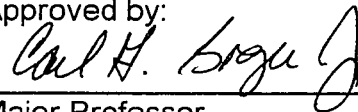
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ABSTRACT

The purpose of this study was to analyze the effects of learning styles inventories (LSIs), demographics and of two delivery methods (DMs) on achievement gains (Ag) and on total study time (ST). A specific objective of the study was to determine whether a LSI or the DM has an effect on AG scores. Another specific objective of this study is to determine if ST, was related to LSI or DM.

Demographic variables were also employed to seek relationships between LSI, AG and ST. A learning style was defined by Kolb and determined by the Marshall and Merritt Learning Style Questionnaire. DMs included CD-ROM interactive multimedia and video-lecture, and subjects included students enrolled in introductory hospitality management classes in selected Midwestern state land-grant universities. Subjects were administered an identical pretest and posttest consisting of 21 questions. A sample of 237 students produced a mean AG score of 2.27 questions. Neither the LSI nor the DM used had a significant ($p \leq .15$) impact on AG. Mean ST was 44.72 and 38.78 minutes for IM and VL, respectively. Significant ($p \leq .15$) differences were not determined between the LSIs but were determined between the two DMs with regard to ST. Post hoc comparisons suggested a difference in ST between DMs at lower age levels. The demographic variables class, gender, age, ACT score, and GPA were compared to learning style inventories (LSIs). One LSI, Diverger, was found to be related to students with lower GPA. A review of similar studies revealed similarities between distributions of learning styles.

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DEDICATION

This dissertation is dedicated to my son Samuel Joseph Bagdan.

May you also obtain the goals that you aspire to.

CHAPTER 1

INTRODUCTION

Several institutions of higher education offer hospitality-related training programs. Futurists predict that technology will play an increasingly important role in these programs (Kasavana, 1993; Soinnie, 1998). As technology enters the classroom and distance education increases in importance, students, teachers and administrators need assurance that learning needs can be met through the use of technology (Freeman, 1995). Therefore, evaluation will continue to be a critical component of the technological process (Cyrs, 1997).

A limited number of studies investigating the achievement rates of technologically-advanced delivery methods have been found. Buergermeister (1989) compared the achievements of both users and non-users of computer spreadsheets, with learning styles according to Kolb. Two of the learning styles had a positive correlation within achievement scores, suggesting a relationship between learning style and achievement. In contrast, Freeman (1995) compared the effects of Kolb's Learning Styles on achievement, with interactive video and with traditional classroom instruction. No significant differences were determined based on delivery methods, and only one, mildly significant difference based on delivery method was found.

Statement of Purpose and Objectives

The purpose of this study was to analyze the effects of learning styles, demographics and of two delivery methods on achievement gains and on total study time. A learning style was defined by Kolb and determined by the Marshall and Merritt Learning Style Questionnaire. Delivery methods included CD-ROM and video-lecture, and subjects included students enrolled in introductory hospitality management classes in selected Midwestern state land-grant universities.

A specific objective of the study was to determine whether a learning style or the delivery method had an effect on achievement gain scores. Another specific objective of this study was to determine if total study time (ST), also referred to as study time, was related to either learning style or delivery method. Demographic variables were also be employed to seek relationships between LSI, achievement gain scores and study times. This study will add to the literature examining these variables.

Significance of Study

Individual learning styles and instructional delivery methods are two factors that have been reported to affect test achievement of college students (Buergermeister, 1989; Jia, 1992; Al-badr, 1993; Lyons-Lawrence, 1994). Consequently, *teachers and administrators need to evaluate the outcomes of delivery methods as associated with learning styles, in an effort to ensure that*

quality education is provided for students. This study examined the relationship among delivery methods, learning styles and demographics, and determine their effect on various test achievement outcomes.

Statement of Problem

Video-lecture and multi-mediated instruction have been used as delivery methods in distance education. Studies comparing the test achievement outcomes of these delivery methods are inconclusive. Few studies have focused on the relationship between delivery methods, learning styles and student achievements (Freeman, 1995). Few previous studies were found that determined pretest/posttest achievement rate gain of hospitality students using multi-mediated material. This study proposes to add to the literature examining the relationship between these variables.

Hypotheses

The primary design of research consisted of a randomized, complete block design. Independent variables included learning style inventories (LSIs) and delivery methods (DMs), with achievement gain (AG) and study time (ST) as dependent variables.

The following hypotheses were be tested:

Hypothesis #1A. Achievement Gain (AG) is not an effect of Delivery Methods (DMs).

Hypothesis #1B. Achievement Gain (AG) is not an effect of Learning Style Inventory (LSI).

Hypothesis #2A. Study Time (ST) is not an effect of DM.

Hypothesis #2B. ST is not an effect of LSI.

Hypothesis #3A. ST is not an effect of demographic variable Gender.

Hypothesis #3B. ST is not an effect of demographic variable Class.

Hypothesis #3C. ST is not significantly associated to demographic variable Age.

Hypothesis #3D. ST is not significantly associated to demographic variable ACT.

Hypothesis #3E. ST is not significantly associated to demographic variable GPA.

Hypothesis #4A. AG is not an effect of demographic variable Gender.

Hypothesis #4B. AG is not an effect of demographic variable Class.

Hypothesis #4C. AG is not significantly associated to demographic variable Age.

Hypothesis #4D. AG is not significantly associated to demographic variable ACT.

- Hypothesis #4E.** AG is not significantly associated to demographic variable GPA.
- Hypothesis #5.** AG is not significantly associated to ST.
- Hypothesis #6A.** LSI is not an effect of demographic variable gender.
- Hypothesis #6B.** LSI is not an effect of demographic variable class.
- Hypothesis #6C.** LSI is not an effect of demographic variable age.
- Hypothesis #6D.** LSI is not an effect of demographic variable ACT.
- Hypothesis #6E.** LSI is not an effect of demographic variable GPA.
- Hypothesis #7.** The LSI distributions of this study are equal to the LSIs in other studies.

Since chapters #4 and 5 of this edition of the study were prepared for article-format, the hypotheses will be renumbered. Hypotheses #1 through 5 will be included in chapter #4, and hypotheses #6 and 7 will be included in chapter #5. Chapter #6 will summarize the findings of all hypotheses in the original order.

Operational Definitions

achievement gain score: difference between scores obtained on pretest and posttest administration (a.k.a. achievement gain, AG).

delivery method: form or medium in which students receive instruction (DM).

learning style profile: a set, style, or pattern that categorizes the process of how an individual learns.

learning style questionnaire: a written examination that determines learning style profile (LSQ).

interactive multimedia: a delivery method that combines sound, video, animation and computerized text (IM).

pretest: written, 21 question, multiple-choice test containing demographic questions.

posttest: written, 21 question, multiple-choice test, on the subject of customer service in a front desk setting of a hotel, also including questions identical to those on the pretest, with the addition of a question regarding study time.

total study time: total amount of time dedicated towards instruction and study. (a.k.a. study time, ST)

video-lecture: a delivery method that consists of a video-tape of a typical classroom lecture (a.k.a. VL).

Limitations

The Marshall and Merritt Learning Style Questionnaire Semantic Differential (LSQ-SD) was the instrument used to interpret learning style preferences. The LSQ-SD parallels components of other learning style questionnaires, such as the use of a Likert scale, being easy to administer, and being rooted in Jungian theory; however, other learning style inventories will not

be used. Only Midwestern, baccalaureate students enrolled in introductory-level hospitality classes at selected land grant universities was used in this study. Consequently, the results of the study are considered generalizable only to the four universities in the study.

It should also be mentioned that Kuder-Richardson's test for Reliability found the alpha value of the achievement tests to be low. This may be attributed to the low number of questions (21) on the examination. This finding suggests that the results of the achievement tests cannot be replicated. Also, despite the observed serious intent of the students with respect to the study, demographic data were self-reported.

Assumptions

It is assumed that the Marshall and Merritt LSQ-SD adequately measured learning style preferences, as stated in reliability studies. Students used as subjects in this study were representative of typical Midwestern undergraduate students enrolled in introductory-level hospitality classes at the universities selected in this study. Both delivery methods used are representative of delivery methods currently used in the field of higher education. It is also assumed that the two delivery methods contained similar content and validity, as determined by local content specialists.

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CHAPTER 2

REVIEW OF LITERATURE

The purpose of this chapter is to provide an overview of research on distance education, learning styles and field studies. The review of literature has been divided into three main sections. The first section focuses on distance education, reviewing its contrasting definitions and characterizations. The second section defines and interprets various learning styles. Kolb's learning style inventory (LSI) and Marshall and Merritt's Learning Style Instrument, which are used in the study, are described in more detail. The third section focuses on field studies involving both delivery methods and learning style inventories. Demographics are also reported when employed in the studies. In effort to provide a thorough review of the literature, information used in the review of literature came from a variety of sources that included trade publications, articles published in peer review journals and published theses and dissertations.

Distance Education

Introduction

This section is divided into sub-sections regarding distance education (DE). The definition sub-section reviews the variety of definitions and interpretation of DE. Its classifications, interactivity and dependency, and

linearity are reviewed and illustrated; and its history and progression are reviewed. Lastly, a need for DE is included, involving the changes in demographics.

Definition

Distance education has a variety of definitions and interpretations. Moore's (1973) classic definition states, "Distance teaching may well be defined as the family of instructional methods in which the teaching behaviors are executed apart from the learning behaviors, including those that in a contiguous situation would be performed in the learner's presence, so that communication between the teacher and the learner must be facilitated by print, electronic, mechanical and other devices" (p. 664).

Keegan (1986) warned that distance education can either be defined as a narrow extreme thus becoming a mere abstraction of itself, or be defined so broadly that it becomes vague in its interpretation. With this in mind, he suggested a more encompassing definition comprised of five interdependent elements:

- 1) The separation of teacher and learner;
- 2) The involvement of a teaching organization which oversees the creation, implementation and follow-up support of instructional services;
- 3) The use of technology to impart instructional services;

- 4) The use of two-way communication between the student and the teaching organization; and
- 5) The use of an individualized learning setting, apart from other students (p. 49).

Shale and Garrison (1990) analyzed Keegan's definition and argued that a less restrictive definition of "distance education" would be more appropriate. Their definition allowed the term distance education to expand its scope rather than limit its boundaries. The authors therefore suggested adopting a set of minimum criteria for characterizing the activities of distance education rather than seeking a definition. With this in mind, they suggested that the definition of distance education be comprised of three interdependent elements:

- 1) Distance Education implies that most communication between the teaching organization and the student does not occur face-to-face;
- 2) Distance Education uses two-way communication between the student and the teaching organization; and
- 3) Distance Education uses technology to support two-way communication (p.11).

Classifications

Distance education has been classified into many categories during its development. Garrison (1989) summarizes commonly found categories in Table 1 as one-way and two-way communications, and first, second and third

Table 2.1
Division of the Delivery Methods of Distance Education

Classifications				
Communication	Method	Generation	Medium	Delivery Mode
Two-way	Correspondence	First	Print	Mail
	Teleconferencing	Second	Audio/Video	Telecommunication
	Microprocessor	Third	Audio/Video (Alphanumeric)	Microprocessor
One-way	Print Material			
	Audio/Video Cassette			
	Audiographics			
	Laser Videodisc			
	Broadcast			

Note. Adapted from Garrison, D.R. (1989). Understanding Distance Education.
 New York: Routledge. p. 50.

generations. The evolution of these categories will be discussed in the following History and Progression section.

History and Progression

The progression of distance education found in the literature reveals that it is not a new subject (Charp, 1998). Biblical writings in St. Paul's Epistles to the Corinthians date back two-thousand years while correspondence education appeared several hundred years later. Historical newspapers show references to lessons taught via correspondence, dating back over 250 years. This has later been followed by telecommunications, audio-visual media, and finally the desktop computer which integrates all three mediums (Garrison, 1985).

Biblical writings were probably the earliest definitive forms of distance education. St. Paul wrote letters, or epistles, to various churches of the New Testament. A message or lesson was conveyed through these letters to those unable to attend his teachings. According to Table 1, this form of distance education would be classified as "first generation, one-way."

Correspondence, two-way education, is created by combining printed material with a postal system. This is the earliest form of two-way communication and represented a major shift that has revolutionized distance education. Students and teachers are able to communicate with one another for feedback and support. Two-way communication response time was slowed considerably by the postal system. This placed added burdens on both students

and teachers. Students were required to have a strong desire to complete the distance courses successfully. Newspapers reveal advertisements of correspondence courses offered over 250 years ago (Garrison, 1985); the first collegiate-related correspondence course began with the University of Chicago in 1892 (Pittman, 1987). This form of distance education has been largely successful. It provided the opportunity for learning enrichment to vast numbers of students, by providing them with the freedom to decide the time and the place they wished to study. It has been suggested that correspondence education was crucial to the western commercial and industrial revolutions (Harris & Williams, 1977). While many other mediums have entered the DE arena, correspondence learning was still considered the most prevalent form of distance education in the mid-1980's (Garrison, 1985).

While correspondence was increasing in popularity, distance education also was integrating telecommunications. This may be defined as the electronic transmissions of communications over a distance. This delivery mode can be divided into one and two-way communications. The more recent advancement of telecommunication, which has enabled two or more people to interact simultaneously, is audio-conferencing. Its use marks another significant innovation in delivery methods for distance education (Garrison, 1985).

Audio communication has been used as an instructional method since the founding of WHA-radio's "School of the Air" in 1920 (Shale and Garrison, 1990). Its scope has included both one-way, linear audio communication; and two-way,

audio-conferencing communication in the past. Although earlier dates of research may be found, serious efforts in the advancement of audio-conferencing technology and methods were not made until the late 1960's. By 1988, it was the most widespread application of information technology in distance education (Winders, 1988). Audio-conferencing was thought to be a technological progression in correspondence, since it enabled correspondence to take an audible form (Garrison, 1985).

Audio-instruction first came into existence with instructional programming in the 1950's (Shale and Garrison, 1990). In its linear form, it does not suspend two-way communication, and learners can fast-forward or rewind and review the content at their own pace. A later addition to distance education was the development and integration of video. The drastic price reduction of video cassette players in the late 1970's offered linear video at a low cost with increased freedom for many distance learners (Hilliard, 1978). This provided learners with low-cost, high quality visual and audible instruction. Broadcasts were other means of linear audio and video instruction. These broadcasts have served as a popular alternative delivery method in many educational settings (Duke, 1983).

During the late 1970's through the 1980's, the personal computer replaced the mainframe as the primary computer tool. The invention of the Altair 8800 can be credited with the evolution from mainframe to personal, or desktop, computing (Ranade & Nash, 1994). As the personal computers developed and

prices decreased, software provided increasingly better quality tools for the production tools of distance education. Video was equipped to accommodate two-way communication. This entails an audio-video computer interface, which is currently the newest form of multimedia. One main difference between linear video and two-way tele-conferencing has been the inferior quality of visual resolution and the delays of tele-conferencing. Until the Internet II, a high-speed networking of computers, is implemented and made widely available, tele-conferencing is considered a costly and involved alternative (Lawlor & Weber, 1997).

Interactivity and Dependency

Another aspect of distance education found in the literature is that of interactivity. It has been considered presumptuous to precisely scale or rate distinct delivery methods (Garrison, 1985). The design of one-way methods would provide low or virtually non-existent interaction. Learners would not be provided with the means to communicate or interact with the instructor. Alternatively, the design of two-way delivery methods would typically involve medium to high levels of interaction, providing opportunities to communicate with the instructor (Duke, 1983). Computer conferencing, videotext and audiographics might be classified as having medium to low independence and medium interaction. Figure 1 shows computer assisted learning as having high interaction and linear video as having low interaction.

Another emerging aspect of delivery methods found in literature that transcends most other classifications is that of levels of dependency. This can be summarized as the level of freedom provided to both the instructor and the student in the learning process (Garrison, 1985). A delivery method that requires both the student and the instructor to travel to a predestined location at a specific time, thus limiting access to equipment and communication and preparation and/or study time, would be characterized as low independence. An example of such a constraint is two-way video instruction. A delivery method that did not require either the student or the instructor to travel to a predetermined location at a specific time, and allowed freedom in preparation and study, would be characterized as high independence. An example of this freedom is correspondence instruction.

Garrison (1985) argued that self-directed computer-assisted instruction can and should be considered to have both high independence and high interaction. Garrison stated that computer software programs provide a medium for quick two-way communication with the learner. A high level of interaction is also demonstrable through the use of artificial intelligence in advanced software. Computer assisted learning (CAL), also referred to as CAI, also provides the learner with freedom or independence. Recent increases in the availability and transportability of multimediated computers provide students with the independence of when and where they can study.

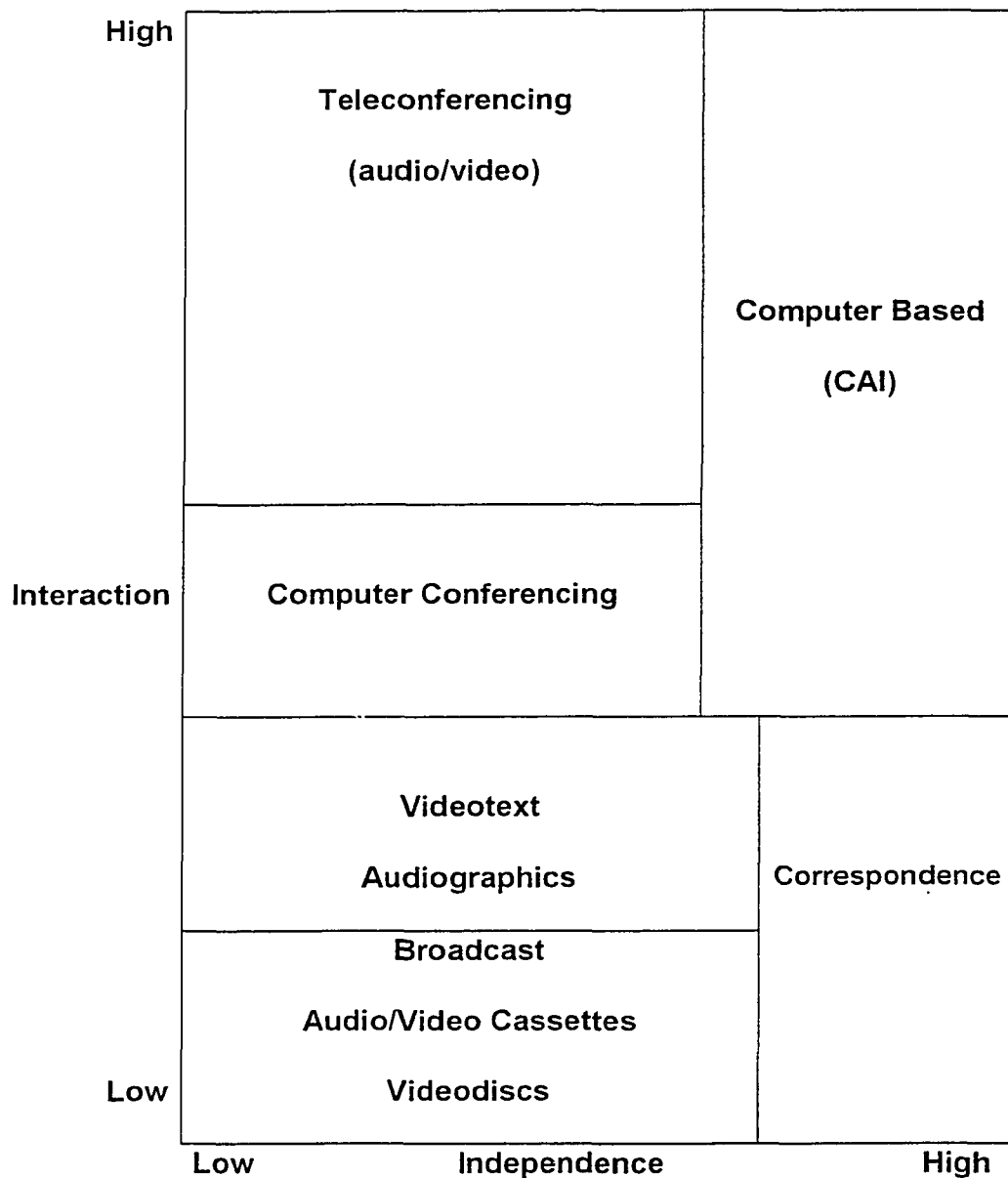


Figure 2.1. Distance education media as a function of interaction and independence.

Note. Adapted from "Three generations of technological innovations in distance education," by D.R. Garrison, 1985, Distance Education, 6(2) p.240. Copyright 1985 by Melbourne: School of External Studies, Royal Melbourne Institute of Technology Limited, 1985. Reprinted with permission.

Linearity

Lastly, the term "linearity" is often found in literature. This can refer to two different qualities of a delivery method. The first use of this term refers to the ability of a delivery method to allow the student learner to move through a lesson or lessons in sequence. A linear lesson, however, does not allow a student to review material or take alternative paths through a lesson. A non-linear lesson, in contrast, allows a student to freely navigate through any section in the lesson. The second use of this term refers to the communication channel in the instruction. A linear delivery, such as linear audio, refers to the one-way communication, and "nonlinear" refers to two-way communication.

Change in Demographics

A factor that will affect distance education is the projected change in college enrollment. More students are entering college than in the past, and high-school graduating classes are expected to increase more than 25% between 1996 and 2005. College matriculation has recently risen from 56% in 1980 and is approaching two-thirds of the average high school graduating class. This increase would return the enrollments of the nation's universities to peak levels unseen since 1979. This percentage is expected to continue to grow, which will increase the demand for improved strategies for distance education within universities (Green, 1997).

Demographics of students entering the university system have been projected to change. Following a recent 16-year decline, the traditional age of

the college population is rising. Non-traditional students will increase substantially in proportion to other categories of students. In the future, there will be more students age 35 and older than ages 18 and 19. Enrollment in two and four-year colleges could increase from 15 million to over 20 million students and be largely populated with non-traditional students by the year 2010, if projections are accurate. A percentage of these non-traditional students will have special needs, such as day jobs and families, and therefore require some form of distance education (Green, 1997).

Summary

This section of the review of literature reviewed elements of distance education (DE). A definition reviewed the variety of definitions and interpretations of DE. Its classifications, interactivity and dependency, and linearity were briefly reviewed; and its history and progression provided greater insight into its origin and evolution. Lastly, a need for DE summarized future changes in demographics.

Learning Style Inventories

Teachers should always keep a Chinese proverb in mind:

"I hear and I forget,

I see and I remember,

I do and I understand" (Chinese Proverb).

Many researchers nevertheless believe that individuals learn differently. Some people appear to learn from listening and conceptualizing, and some prefer a concrete experience. Most educators disagree on what constitutes optimal learning.

Introduction

This section is divided into sub-sections regarding Learning Style Inventories (LSIs). A background sub-section provides a brief history and overview of learning styles. Following sub-sections review elements of field dependence, style, dimensions, and shifts. Then, a review of six common learning style theories and/or instruments is provided. Kolb's LSI and Marshall and Merritt's LSQ-SD, the theory and instrument used in the study, are reviewed.

Background

The process of attaining and retaining information, or learning style, has been studied by social scientists for a number of years. Significant research in the field began in the 1940's and 1950's (Stevens, 1985). Foundational learning style research began in 1945 with studies performed at the Brooklyn College, the Wenninger Foundation and the Fel's Institute (Karrer, 1988). Research was primarily based on children and animals prior to 1945. It has become more recently widely accepted that the individual characteristics of learners, or learning styles, can affect the receiving and processing of information (Fincher, 1995).

Learning style theorists have proposed that no one, singular instructional method provides optimal learning (Fincher, 1995). All learning style inventories have attempted to measure learning style preferences; however, wide differences have existed between their various outcomes. Models are too broad, and many of the instruments are said to assess learning unevenly (Nam, 1995). Fischer and Fischer (1979) stated that learning style inventories have been called a “double-edged sword” in that they can either clarify and analyze, or can “paper-over” confusion, thus making the complexities of learning appear more simplistic than in actuality (p.245). Not a single learning style theory has it all (Keefe, 1988), and much research of the learning process still remains to be conducted (Marshall, 1995).

Learning style theorists have stated that one reason for the variety of theories is that each has contributed only partial insight of a totally accurate explanation of how individuals gain and retain knowledge (Dunn & Dunn, 1979). Many years ago, Piaget interpreted learning in terms of individual developmental stages (Flavell, 1979), and Jung (1923) interpreted it as introversion and extroversion. A few years later, Dewey (1938) promoted experiential learning, and eventually Lewin used group dynamics and action research (Kolb, 1984A). Kolb (1976) combined these ideas in his experiential learning theory. This study is considered by many researchers to be the basis of pedagogical learning style development (Hsu, 1989).

Field Dependence

A major development in learning theory comes from dependence theory. Witkin (1977) identified two types of styles known as field dependence and independence. Individuals with field dependent styles have a very difficult time identifying target stimuli from the background "noise". They rely on external directions in tasks and find it difficult to separate parts from a whole. Individuals with field independent styles are described as having the ability to avoid being easily confused by background stimulation. Furthermore, field dependence theories provide an important parallel to Kolb's learning style theory, which will be discussed in the "Kolb" sub-section (Aneduga, 1989).

Determining an individual's level of field dependence has helped students and counselors in career decisions. Field independent individuals tend to prefer math and science related fields, while field dependent individuals often prefer fields in elementary and childhood education, speech therapy, nursing, social work and business. No level of field dependency is better than another. The analysis is to be used only as a tool in evaluating the learning and understanding of individuals (Witkin, 1977; Rolle, 1993).

Style

Concern for the proper use of the term 'style' is found in learning style literature. Fischer & Fischer (1979) defined the term 'style' as a "pervasive quality in the behavior of an individual, a quality that persists through the content of change" (p.245). In short, different styles indicate different processes of

dealing with information (Guild and Garger, 1985). Fischer and Fischer (1979) stated that learning style is not to be identified with cognitive method because it has a different scope. These authors also asserted that people may infuse different methods with their own style.

The literature disclosed whether or not to provide a distinction between learning style and cognitive style. Some researchers believe that both concepts foster an understanding of how individuals process information. In contrast, other researchers believe that learning and cognitive styles are different, asserting that learning style is related to, but more individually specific than, cognitive style (Korhonen, 1986). Cognitive style thus refers merely to an individual's preferred mode of perceiving information, and/or cognitive processing, which would include both perceptual and intellectual functioning (Rule & Grippin, 1988). Keefe (1988) in contrast described learning style as an encompassing umbrella term of *affective, cognitive and physiological traits*. These traits are indicators that describe how an individual perceives and *interacts with the surrounding environment*.

Dimensions

Learning theorists can be categorized into two groups: 1) those who focus their interests on the cognitive dimensions of learning styles; and 2) those who focus on the applied models of learning, and teaching, and a multidimensional analysis of styles (Karrer, 1988). DeBello (1989) described multidimensional

models as offering a comprehensive and responsive advance to the study of the complexity of differences that explain student learning.

Kolb's LSI would be classified as a multidimensional model that explores the physiological and affective dimensions. Physiological aspects also influence the way students learn. The physiological dimensions of learning styles include both physical and biological aspects of the environment. Physical aspects include visual, auditory, kinesthetic, taste, smell, and spatial characteristics. Biological aspects refer to inner rhythms such as a desire for food during study, optimal learning, and health and nutrition (Cornet, 1983; Dunn and Dunn, 1979). The affective dimensions of learning styles may also include emotional and personal characteristics such as motivation, value, interest, attention and social preference (Cornet, 1983; Keefe, 1988).

Shifts

Another recent issue is the theory that learning styles shift as individuals are exposed to varying situations. A study by Ferguson and Berger (1985) found that individuals in a hospitality management curriculum, with a low grade point average, shifted learning styles during a study (Ferguson & Berger, 1985). Similar long-term studies have been conducted at Iowa State University with mixed results. No conclusive evidence has been found in the literature. Only theories that learning styles shift exist to date (Hsu, 1998).

Canfield

There are many different types of learning styles. The Canfield LSI was developed in 1972 as a tool to aid in understanding students' difficulties in completing academic units. This LSI focuses on the attitudinal and affective dimensions of learning style, rather than on the cognitive dimensions (Cornet, 1983). Canfield's LSI measures four primary areas:

- 1) conditions of learning;
- 2) content of learning;
- 3) mode of learning; and
- 4) student expectations in a learning situation.

The author defined learning style as being academic conditions, or the relation with instructor and peers; structural conditions or organization and detail; and, achievement conditions, goal setting, and competition. The author also defined learning style as being derived by content (numbers, words, etc.); the mode of preferred learning or listening, and reading, between iconic and direct experience; and the expectation of performance level (superior through satisfactory) (Sewall, 1986).

Individuals complete a self-response, thirty-question survey by placing a rank number in each blank. The test is estimated to require 15 minutes to administer (Anderson, 1993). Individuals are classified into one of nine possible typologies. The questionnaire has been primarily administered to individuals

ranging from junior high students through adults. It may be used for whole class assessment, in addition to individual students, and in counseling, because of its ease to administer (Sewall, 1986).

Dunn and Dunn

Kenneth and Rita Dunn are among the earliest researchers in the field of learning styles. They developed the Productivity Environmental Preference Survey (PEPS) in 1979 (Guild and Garger, 1985). Dunn and Dunn defined learning style in terms of the conditions which teachers can change, rather than in terms of the variables which directly cause learning. "PEPS" uses a diagnostic/prescriptive approach to learning and is classified as having a multidimensional-theoretical structure, with a position that individual styles must be addressed, and instructional techniques must be accommodated for optimal learning.

The PEPS-LSI lists five stimuli: environmental, emotional, sociological, physiological and psychological; and 21 elements grouped within the stimuli. The responses are unequally distributed due to the nature of the preferences. Below are the stimuli, with brief interpretations:

- 1) Environment: sound, light, temperature, design;
- 2) Emotion: motivation, persistence, responsibility and a need for structure;
- 3) Sociology: working alone, in a pair, with peers, or a combination;

- 4) Physiology: perceptual modalities or strengths, the need for intake, time-of-day energy periods, the need for mobility vs. passivity; and
- 5) Psychology: global/analytic, hemisphericity, and impulsive/reflective characteristics (DeBello, 1989).

The PEPS-LSI questionnaire contains 104 true-false questions, and its administration is estimated to take 30 minutes. It was once the most widely used inventory (DeBello, 1989). The instrument is directed for use with adults but is also available in a form for grades 3-5 and a form for grades 6-12 (Guild and Garger, 1995). PEPS-LSI also has different adaptations including the "Primary" and the "Reading Style" Inventory versions. The LSI Primary version, an adaptation by Dr. Janet Perry, is used for non-readers. The Reading Style Inventory (RSI) by Dr. Marie Carbo is similar in framework and Jungian theory to Dunn and Dunn's LSI (Carbo, Dunn & Dunn, 1986; DeBello, 1989).

Gregorc

Anthony Gregorc researched the Gregorc Style Delineator in 1979 with the concept that individuals display a duality in learning, that is, perception and order. Gregorc suggested that individuals have inborn predispositions which can be both encouraged and disciplined (DeBello, 1989). Gregorc was similar to Dunn & Dunn in that he believed in matching instructional methods or materials to meet a range of desirable learning styles and placed considerable stress on strengthening areas that are in need of development. Gregorc interprets learning style by observable behaviors that provide clues that explain individual

thought processes and their relation to the world (Sewall, 1986). These clues suggest that people learn in combinations or dualities of perception and ordering. Initial evaluation yields four distinct learning patterns, after abstract/concrete and sequential/random dimensions are combined:

- 1) Concrete Sequential: these learners acquire knowledge through direct hands-on experience. Ordered and step-by-step instructions are preferred.
- 2) Concrete Random: these learners display experimental attitudes and behaviors. Trial and error and intuitive approaches are preferred.
- 3) Abstract Sequential: these learners have decoding abilities with written, verbal and image symbols. They prefer rational and sequential learning.
- 4) Abstract Random: these learners are attentive to human behavior. They prefer learning in an unstructured manner in discussions and activities that involve multisensory experiences (DeBello, 1989).

Gregorc's survey instrument is rank ordered. It has ten sets of four words and is similar to Kolb's LSI. The instrument is considered to be a self-examination, although interviews and observations are suggested to facilitate the survey (DeBello, 1989). The delineator takes approximately five minutes to administer, excluding interviews and observations (Sewall, 1986).

Meyers-Briggs

Katherine Cook Briggs and Isabel Briggs-Meyers developed the Meyers-Briggs Type Indicator in 1962 to support the theory that learners are orderly and consistent in perception and judgement. The MBIT is based on Jung's theory of personality type, which views learning as being comprised of perception and judgment (Nam, 1995). "Form G" consisting of 126 items was introduced in 1977. This is a shortened version of "Form F," from which 40 additional items were eliminated. Thirty-eight of these were considered experimental and had not been scored on any standard scales (Sewall, 1983). The survey is self-reported and contains multiple-choice terms. Administration is approximated at 30 minutes. The evaluation provides the learners with a combination profile of four subscale pairs:

- 1) extroversion/introversion (E-I),
- 2) sensing/intuition (S-N),
- 3) thinking/feeling (T-F), and
- 4) judging/perception (J-P).

Extrovert types direct their personal energy towards the outwardly, are gregarious and talkative, think afterwards and act first. Sensing types perceive by use of their senses and are accurate, realistic, traditional and concrete. Thinking types draw conclusions by use of analytical, rational and practical thinking and may encounter difficulty recognizing others' feelings; however,

thinking types do seek and desire fairness. Judging types are quick to make decisions, are organized, prefer to plan ahead and work steadily towards achieving goals.

Introverts direct their energy inwardly and rely more on reflection and inner-feelings, preferring quiet, private time to sort through their ideas. Intuitive types are creative and innovative and often act on a hunch. They are future-oriented, recall inaccurately and do not like routines or details. Feeling types use personal values and feelings in making decisions and desire empathy and kindness. Perceiving types adapt to their surroundings and are open-minded but often procrastinate and delay decisions (Kirby, 1997).

Psychologists and educators around the world use the MBIT to facilitate the teaching and learning of students (Nam, 1995; Carskadon, 1994). Adults may find this instrument useful in understanding basic learning preferences and in determining a compatibility of learning types (Sewall, 1986).

Kolb

D.A. Kolb employed Witkin's field dependence/independence theory for determining cognitive styles with the Learning Style Indicator. His aim was to develop a more applicable psychological theoretical model. Kolb believed that individuals, because of hereditary equipment, past experiences, and the demands of their present environment, develop individual learning styles. Consequently, he developed a four-stage learning process. This process is derived from the experiential learning model of Dewey, which emphasized the

importance of experiential learning, using cognitive theory derived from the social psychology writings of Bruner and Pingein (Paulson, 1993). The core of this model is a continuous learning cycle where experience is translated into a concept that guides an individual's decisions, leading to new experiences (Kolb, 1984A). It is called the experiential learning model, and its four stages are:

- 1) The learner has a concrete experience.
- 2) The concrete experience is the basis for observation and reflection.
- 3) The observations are assimilated into an idea or theory from which implications for action can be deduced.
- 4) These implications serve as a guide in acting to create new experiences. Thus, the cycle evolves (Kolb, 1973).

A multiple-choice, self-reported assessment survey is administered. It consists of nine items with sub-items using rank-order, totaling 36 word choices. An additional 12 words are included as distracters. The self-reported test takes approximately ten minutes to administer and produces one of four dominant types:

- 1) abstract conceptualization (AC);
- 2) concrete experience (CE);
- 3) active experimentation (AE); and
- 4) reflective observation (RO) (Kolb, 1984B).

The questionnaire can be quickly interpreted by either the proctor or the learner. The relative amount of abstractness or concreteness in learning style (AC-CE), and the relative degree of activity or reflectiveness (AE-RO) determine

the two composite scores. The AC-CE and AE-RO scores are then plotted vertically and horizontally on a vertical and horizontal axis, respectively, while a dominant learning style is determined. This is illustrated in Figure 2.2. The quadrants with appropriate interpretations are as follows:

- 1) Converger: AC and AE: strength lies in finding practical uses for ideas and theories;
- 2) Diverger: CE and RO: strength lies in viewing concrete situations from many different points;
- 3) Assimilator: AC and RO: strength lies in ability to place large amounts of information into theoretical models or logical order; and
- 4) Accommodator: CE and AE: strength lies in hands-on experience or in the carrying out of plans (Kolb, 1976).

Kolb proposed that a well-integrated learner would use all four modes. Most learners develop only one of these modes as being most effective due to hereditary and societal experiences. Kolb's LSI (1976) reflected that individual learners of virtually any age will use varying combinations of knowledge-building approaches depending on the situation and the personality of the individual. Individual learners must have the abilities that are opposite of their strengths in order to be effective. For example, learners with an Accommodator (ACCOM) style must be proficient in Assimilator (ASSIM). This would allow the learner to adapt to situations that require different learning styles.

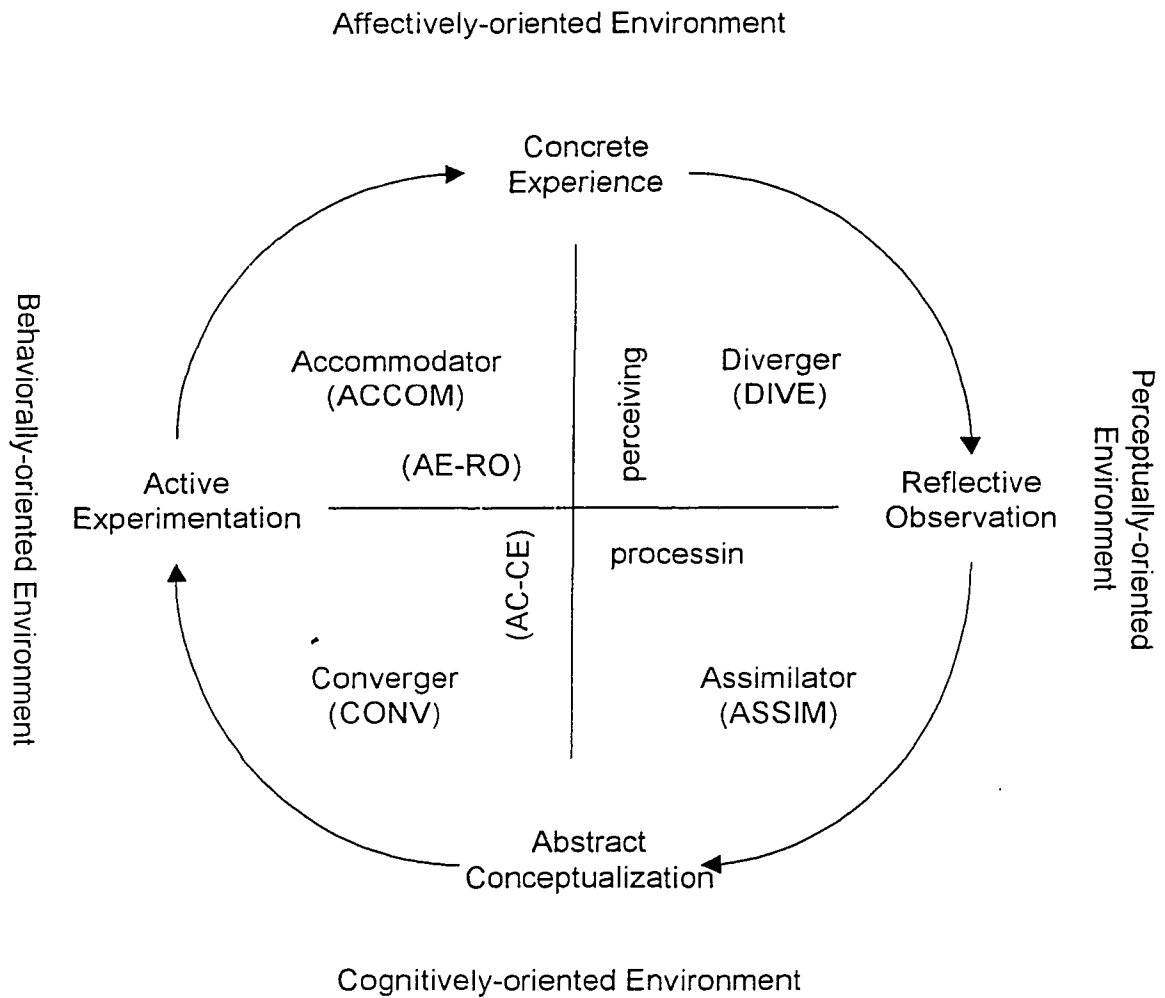


Figure 2.2. Kolb's learning style model. Note. Adapted from Learning Style Inventory: Self-scoring Inventory and Interpretation Booklet Kolb, D.A. (1984). Boston, MA: McBer and Company, (p.6)

Kolb's LSI has been employed as an instrument in many studies determining learning style. It is commonly used in many fields including the hospitality profession. Tamaoka (1985) generalized that Kolb's LSI may connect a student's learning style with the student's subject major. The same study also reported that learning styles assessed by Kolb may be relatively stable over a fairly long time, thus refuting learning style shift theories. Furthermore, Seawall (1986) stated the Kolb's LSI may be used to adequately determine a student's learning style, to focus on strengths and build upon non-dominant areas. However, one limitation of Kolb's LSI instrument is its statistical characteristics in that it is an ipsative measurement. Ipsative format categorizes learners into a LSI quadrant with no degree of intensity. This means that the degree of individual responses may not be compared with others (Marshall & Merritt, 1984).

Marshall and Merritt LSQ

Sharon Marshall and Jon Merritt (1984) conducted reliability and construct validity studies on Kolb's Learning Style Instrument and an alternative (normative) instrument called Marshall and Merritt LSQ. This new instrument was designed to profile Kolb's original LSI by using an alternative normative evaluation. This was done in an effort to provide additional statistical qualities to the results. The alternative LSQ (LSI-N) used a word list identical to that of Kolb's. Respondents were asked to rate each word, according to preference, as it was characteristic of their individual learning style. The new four Likert-scale

choices were "characteristic," "somewhat characteristic," "somewhat uncharacteristic" and "uncharacteristic." This altered the word list to statistically accommodate normative evaluation. The LSI-N was found to support construct validity with some of the LSI items when compared to Kolb's, but lacked cross-validation (Merritt & Marshall, 1984).

Marshall and Merritt (1985) performed another study comparing the LSI-N and a revised LSQ comprised of the same word list. This revised LSQ had an increased structure for response and was called the learning style inventory semantic differential form (LSQ-SD). Each word was contrasted with a theoretically opposite word according to the learning style. For example, the concrete experience word "accepting" was contrasted with the theoretically opposite word "questioning." Respondents were asked to rate their views consistent to their learning on a five-point likert scale. The LSQ-SD was administered to a sample of 181 of the 343 undergraduate subjects that received the original LSI-N to determine the alpha reliabilities. Statistical results of the study were very successful. The structure was consistent with Kolb's learning style model but with moderately higher scale reliabilities. Estimates of internal consistency reliabilities were based on the use of an alpha coefficient. LSI-N reliabilities varied from 0.546 to 0.725, and LSQ-SD scale reliabilities varied from 0.608 to 0.861. All four LSQ-SD scales received higher reliability, compared to the LSI-N. Additionally, equivalence between the two was

moderate when corrected with attenuation. This study strongly suggested that valid normative forms of Kolb's LSI are achievable and therefore can be implemented in studies (Marshall & Merritt, 1985).

The LSQ-SD has been used with success in other hospitality studies. Hsu (1989) performed a national study using the LSI on foodservice managers. Anderson (1993) implemented the LSQ-SD in the evaluation of a quantity food production study at Iowa State University. Both of these studies are described in greater detail in the following field research section.

Summary

This section reviewed aspects of Learning Style Inventories (LSIs). A background sub-section provided a brief history and overview of learning style research. Following sub-sections reviewed elements of field dependence, style, dimensions, and shifts. Then, a review of common learning style theories and instruments followed.

Field Research

Introduction

This section is divided into sub-sections regarding field research in the areas of delivery methods and learning styles. A background sub-section provides a brief history and progression of field research. Three primary sub-sections follow. The first sub-section reviews delivery method studies. The next section reviews learning style studies, and the third sub-section reviews studies

that have integrated both learning styles and delivery methods. A final subsection summarizes all of the mentioned field-related studies. Demographics were included when employed in studies.

Background

Comparisons of delivery methods are not new. The literature provides numerous examples of comparisons ranging from written instruction through computer-based training. Dewey (1938) described matching learners with the instruction. Studies began with lantern slides in the 19th century, and have advanced to television and eventually to computer-based learning. A majority of the pre-computer-age studies, however, were conducted in the 1950's and 1960's. The recent integration of multi-mediated technology into education has yielded contemporary studies which have explored new dimensions.

The general rationale for interest in learning style studies in computerized self-instruction is that significant differences between media have been found in certain studies while other studies have found no significant differences. Researchers have found that computer-assisted instruction (CAI) can be at least as effective as traditional teachers or other media. Students also appeared to respond more favorably and costs were minimized in the student learning time (Kasavana, 1993). Garrison stated that computer assisted learning (CAL) has feedback capabilities powerful enough to compare to those of a teacher and

"after 25 years of research it can be concluded that CAL can be a more efficient or effective means of instructional delivery than traditional face-to-face instruction" (Garrison, 1985 p.238).

Despite this, many comparisons of CAL, also referred to as CAI, and LSI have been recently conducted, and outcomes are less than conclusive (Nam, 1995; Russell, 1992). Chung (1991) boldly stated, "If one lesson has been learned by researchers in instructional technology conducting media comparison studies, it is that the medium is NOT the critical factor in student learning" (Chung, 1991 p.40). Clark (1983) performed a meta-analysis of mediated instruction; no significant difference was found for any one medium over another. Clark stated that consistent evidence supports the generalization that there are no learning benefits to be gained from any specific medium to deliver instruction (Clark, 1983). Batey and Cowell (1986) stated, "good teaching is good teaching, whether the teacher and learner are in close proximity or are at a great distance from each other" (p.16).

Delivery Method Comparison Studies

Nine studies were found to evaluate delivery methods. The first three studies are meta-analysis, or surveys of literature. The following studies are experimental in nature. Significant differences were found in achievement, reception and learning time.

One of the most exhaustive examinations prior to 1967 was conducted by Chu & Schramm (1967). Results of 421 comparisons made between

instructional television and conventional classroom instruction are shown in Table 2.2.

The comparison of elementary students, secondary school students, college students and adults yielded many non-significant differences; however, there were implications. Chu and Schramm (1967) concluded, "although a statistical test for the significance of such differences would not be appropriate in this case, these findings consistently indicate that television instruction is apt to be more effective in teaching primary and secondary school students than college students" (p.13). The literature yielded no recent studies of similar magnitude.

Jameson, Suppes and Wells (1974) conducted an early survey of literature in an effort to determine the effectiveness of alternative instructional media. Traditional classroom instruction, instructional radio, instructional television, programmed instruction and computer-aided instruction (CAI) were compared. All subjects learned effectively from all media; no significant differences in achievement were observed. Programmed instruction and CAI failed to allow increased individualization but reduced student learning time (Jameson, Suppes and Wells, 1974). Furthermore, Liao (1998) performed a 35-study meta-analysis, and concluded that the effects of hypermedia compared to traditional instruction were positive.

Table 2.2

Results of 421 Comparison Studies Between Instructional
Television and Conventional Teaching

Education level	Outcomes		
	No significant differences	Television more effective	Conventional more effective
Elementary	50	10	4
Secondary	82	24	16
College	152	22	28
Adults	24	7	2
Total	308	63	50

Note. From Chu, G.C., & Schramm, W. (1967, December). Learning from television, what the research says. (p. 13). Stanford (Report No. EM 005 628) University, CA. (ERIC Document Reproduction Service No. ED 014 900).

Machula (1978) compared video-tape, audio-tape, and print. Two groups of subjects included 45 graduate students enrolled in a library science class at the University of Michigan, and 69 undergraduate students enrolled in an introductory educational psychology course at the University of Illinois. The students were divided into three groups, each receiving identical lessons through a different delivery method. Those receiving audio-taped lessons perceived the lessons less favorably than those receiving the other two delivery methods. No significant differences were found between videotape and printed materials. Machula's findings, although inconclusive, seem to indicate that in at least some contexts the medium used can play an important role in reception and in the content learned. In other terms, the study found that personalities may favor one medium over another.

Jaffe (1989) compared the effects of CAI with printed instruction outcomes of 57 hospitality management students. No statistically significant difference was found. Pirrong and Lathon (1990) compared the use of three delivery methods in an introductory financial accounting course from Idaho's Boise State University. Interactive television was offered to 16 students in remote sites and to 34 students on-campus. Traditional classroom instruction was offered on-campus to an additional 21 students. All three delivery methods were conducted by the same instructor on the same days of the week. Average performance scores were not significantly different (Pirrong & Lathen, 1990). Similarly, Pollard and Kizzier (1992) compared achievements of students that

received either interactive video disc (IVD) or video-lessons. No significant difference was found.

Hake (1998) compared achievement gains between interactive-engagement (E-I) and traditional methods in similar introductory physics courses to over 6000 students. The achievement gain results strongly suggested that the use of E-I can enhance the effectiveness of similar mechanics courses, well beyond that obtained through traditional methods.

Most recently, Sujithamrak (1999) compared the effects of on-the-job-training and interactive multimedia (IM) training methods. Fifty students were divided into two groups and asked to clean hotel rooms after receiving an assigned delivery method. No statistically significant differences based on concept attainment were found between the two groups. Additionally, gender and class level had no significant impact on concept attainment.

Learning Style Studies

Four studies concentrated on the profiling of hospitality students and professionals. The first three used Kolb's LSI or Marshall and Merritt's LSQ-SD while the fourth study used a self-developed questionnaire. All of the studies show different implications.

Berger (1983) used Kolb's LSI in the evaluation of 297 subjects comprised of hospitality program undergraduates, faculty of the program and students that had graduated from the program that were working in hospitality management-related positions. Classifications were varied between groups. A

sample of 241 undergraduate students yielded 33% divergers, 29% accommodators, 19% assimilators and 19% convergers. A sample of 25 hospitality professors yielded 42% convergers, 27% assimilators, 15.5% accommodators and 15.5% divergers. A sample of 31 hospitality student graduates working in the field yielded 32% accommodators, 32% convergers, 26% divergers and 10% assimilators.

When students were divided among grade-point averages, a sample of A-ranking students yielded 38% accommodators and only 11% assimilators. Males were divided equally among learning styles; females were most often divergers and accommodators. No significant difference was reported between hospitality managers and professors with respect to learning style. This suggests that experience and maturity may influence learning style (Berger, 1983).

Hsu (1989) at Iowa State University studied the learning styles of unit and district-level restaurant managers. The Marshall and Merritt LSQ was used to survey a national sample of 163. Seventy-eight percent of the 118 unit managers and 76% of the district 45 level managers had a convergent learning style (Hsu, 1989). Alternatively, Rolle (1993) researched the relationship of Kolb's LSI to post secondary vocational education students in a hospitality

management program and hotel managers in the Bahamas. A sample size of 79 showed that students were 52% diverger, 22% accommodators, 11% convergers and 15% assimilator. Additionally, a sample size of 24 managers yielded 87.5% divergers and 12.5% assimilators with no accommodators or convergers (Rolle, 1993).

Stevens (1985) administered a self-developed learning style instrument to over 500 industry management people at the 62nd Annual NRA Restaurant-Hotel-Show in 1981 at Chicago's McCormick Place. This instrument relied upon age as a primary indicator of learning style. Results were classified into three generational categories:

- 1) Traditionalists: individuals born before 1937;
- 2) In-betweens: individuals born between 1937 and 1947; and
- 3) Rejectionists: individuals born between 1947 and 1962.

The data collected suggested that Traditionalists prefer pedagogy (the art and science of teaching children) more than In-betweens and Rejectionists. Also, Traditionalists prefer andragogy (the art and science of helping adults learn) less than In-betweens and Rejectionists (Stevens, 1985). Stevens (1986) conducted a follow-up study using the same instrument. Data in this experiment were collected from Hotel, Restaurant, and Institution Management students at five selected universities, who were labeled as Synthesizers (born between 1962 and 1967). Results showed that Synthesizers prefer pedagogy over andragogy less than any one of the previous generations.

Combined Delivery Method and Learning Style Studies

Fifteen mediated comparison studies used learning style inventories (LSIs) as a factor in determining test achievement. The first five studies concluded that some type of significant difference in achievement may be attributed to individual learning style. The following eleven studies found no significant differences in achievement. Other relevant findings were mentioned. Table 2.3 outlines the author, medium and partial summaries of findings of these studies.

Buergermeister (1989) compared achievements of users and non-users of computer spreadsheets using Kolb's LSI. The sample consisted of 82 undergraduates enrolled in a cost control class at the University of Minnesota. The study found that concept-achievement among users and non-users had no significant relationship, while prior work experience and concept-achievement were found to be significant. Some classifications of learning style and concept achievement were significant. Kolb's ACCOM and combination "AC-CE" had positive correlation with achievement scores, suggesting a relationship between learning style and achievement (Buergermeister, 1989).

Jia (1994) compared aspects of 101 students at Kansas State University in a computer-aided instruction (CAI) mathematics laboratory. Gregorc's Style Delineator classifications were measured against achievement and other aspects. No significant differences were found between computer (general attitude, anxiety, and confidence) and achievement when compared to learning

Table 2.3
Comparison of Delivery Method Studies Involving LSIs

Citation	Medium						Findings	
	N	Text	Audio	LV	IV	CAI		Lecture
Korhonen (1986)	120						*	N.S.D.: LSI by achievement N.S.D.: LSI by lecture format
Buergermeister (1989)	82					*	*	Sig. Dif.: LSI by achievement (ACCOM scored the highest) N.S.D.: DM by achievement
Chin (1992)	120		*	*				N.S.D: LSI by achievement
Starr (1993)	57					*	*	Sig. Dif.: LSI by achievement Sig. Dif.: DM by achievement
Al-Badr (1993)	55					*	*	Sig. Dif.: LSI by achievement (CONV scored higher than ASSIM) N.S.D. LSI by gender
Paulson (1993)	66	*						N.S.D.: LSI by achievement N.S.D.: LSI by completion Sig.Dif.: ST relates to achievement Sig. Dif.: class level by LSI

N.S.D. : No significant difference (as determined by the individual study)

Sig.: Significant (as determined by the individual study)

Sig. Dif.: significant difference (as determined by the individual study)

L.V.: Linear video

I.V.: Interactive video

CAI: Computer assisted instruction

ST: study time

Table 2.3 (continued)
 Comparison of Delivery Method Studies Involving LSIs

Citation	N	Medium						Findings
		Text	Audio	LV	IV	CAI	Lecture	
Anderson (1993)	124			*		*	*	N.S.D.: LSI by achievement N.S.D.: LSI by completion
Armstrong (1994)	40					*		N.S.D.: LSI by attitude towards CIA
Davis (1994)	165					*		N.S.D: LSI by perceived end user computing skill
Lyons-Lawrence (1994)	75					*		Sig. Dif.: LSI by achievement ("Visually perceptive" students scored higher)
Jia (1994)	101					*	*	Sig. Dif.: LSI by achievement (Concrete Experience scored higher) Sig. Dif.: LSI by "computer liking" (Concrete Experience scored higher)
Wilson (1994)	144					*		N.S.D.: LSI by achievement N.S.D.: gain by "attitude toward CIA" Sig. Dif.: LSI by "attitude toward CIA"
Freeman (1995)	40					*	*	N.S.D.: LSI by achievement N.S.D.: DM by achievement (except in 1 topic area)
Fincher (1995)	29			*	*			N.S.D.: LSI by achievement
Truelson (1995)	122					*	*	N.S.D.: LSI by achievement N.S.D.: LSI by DM Sig. Dif.: LSI by ST

styles. Significant differences were found among concrete learners (higher) and abstract learners (lower) on achievement. Concrete learners liked computers more than abstract learners did (Jia, 1994).

Starr (1993) compared the effects of learning styles, using Canfield's LSI on 90 Arkansas adults, to performance, attitude and completion rates, in distance education. Students in the on-campus class performed significantly higher than students at a distant location. Differences in performance scores were found among learning groups: Neutral, Social and Societal Conceptual. Attitudes, learning style and class location were not significant to the course completion rate. All students completed the course. The author concluded that all adult learners in the study, regardless of learning style, can succeed in distance education (Riley-Starr, 1993).

Al-Badr (1993) sought to determine if selected variables (gender, age, computer aptitude, prior computer experience, computer ownership, and learning style) contribute to achievement in the self-instruction sections of computer application software courses at the Southern University of Illinois at Carbondale. Significant differences in achievement were found between Kolb's learning styles. Convergers produced significantly higher achievement scores than assimilators, with accommodators and divergers in between the two extremes (Al-Badr, 1993).

Lyons-Lawrence (1994) performed research at the San Diego State University on a sample of 75 community college students enrolled in four advanced office systems classes. Learning styles were evaluated based on a

cognitive view of learning style, evaluating field-dependence (nonvisually perceptive) and field-independence (visually perceptive) aspects. All subjects were administered the Closure Flexibility Test, a lesser known learning style exam and a computer-based tutorial. Visually perceptive students scored higher on achievement tests than did nonvisually perceptive students (Lyons-Lawrence, 1994).

Other studies did not find any significant difference. Korhonen (1986) reported findings that neither Kolb's learning style, conforming (lecture of facts) or independent (ideas) methods alone resulted in a significant difference in achievement outcomes in rote (recognition or recall) or understanding. Chin (1992) researched the effect of cognitive learning style on achievement when comparing linear video and linear audio lessons. Results indicated that an alternative LSI (Hill's), predicted achievement.

Paulson (1993) compared learning styles using Kolb and Marshall-Merritt with a newly devised written food-service text manual. The LSQ was administered to undergraduate hospitality students at Iowa State University and surrounding community colleges. No significant differences in achievement were found. Study time was determined to be significantly correlated with achievement. The authors also reported that the most prevalent learning style was diverger and that the second most prevalent style was converger (Paulson, 1993).

Anderson (1993) researched the effect of cognitive learning style, using Kolb's LSI, on achievement and completion rates when comparing the use of interactive video (IV) and traditional classroom. Using a sample of 66 hospitality undergraduate students in Iowa, no statistically significant differences were found in the achievement scores or completion of courses via distance education (IV) and traditional classroom (Anderson, 1993).

Another Kolb-related study was that of Armstrong (1994) who compared relationships between learning style and cognitive, affective, and behavioral attitudes toward interactive videodisc training programs. Forty multi-skilled health care professionals participated in the study. No significant relationships were found between learning styles and attitudes toward interactive videodisc (IVD). Additionally, learning style did not influence attitudes towards IVD in the workplace (Armstrong, 1994).

Davis (1994) researched 165 computer users within six organizations. Outcomes showed that Kolb's LSIs had no strong relationship leading to advanced skill. Age and gender had no impact on advanced skill; results suggested that traditional stumbling blocks for gaining computing skills have disappeared. The study concluded that end-users in the study may achieve advanced levels of skill regardless of their education, previous math courses, or levels within their organizations (Davis, 1994).

Wilson (1994) examined the relationships among learning style using another LSI by Grasha-Riechmann (SLSSI), and attitudes and outcomes of computer-assisted instruction. One hundred and forty-four students in an

educational media course at the University of Northern Iowa were surveyed. Results from a step-wise multiple regression analysis suggested that learning style is not an adequate predictor of either student achievement with CAI or student attitude toward CAI. Additionally, only partial correlation was obtained relating CAI experience, computer experience, gender, year in school, and grade-point average (Wilson, 1994).

Fincher (1995) researched whether Kolb's LSIs affected cognitive and psychomotor achievement when using linear and interactive video lessons. Learning styles did not affect achievement. Truelson (1995) also researched the effects of Kolb's learning styles between lecture and self-paced environment on achievement, when comparing 91 lecture-based multimedia and 31 individualized self-paced multimedia delivery methods among undergraduate students enrolled in a Health Science class. No learning style showed a significant increase in learning achievement. Time was shown to be significantly different, as expected due to the timed lectures; additional test-times did not significantly affect learning styles (Truelson, 1995).

Freeman (1995) compared the effects of Kolb LSI on achievement and interactive video (IV) and traditional classroom instruction. No significant differences in examination scores based on learning styles were found within a group of 40 medical students. Additionally, only one topic area showed achievement difference based on delivery method (Freeman, 1995).

Conclusion and Summary of Results of Studies

The research findings seem inconclusive in the relationship of learning styles and delivery methods. A comprehensive review of the literature yields relatively few studies regarding the contrast of learning style preferences combined with delivery methods. No two studies are identical and outcomes vary significantly. Few studies have been found which investigate demographic variables. None of the studies surveyed were found to investigate both initial-test and delayed-test achievement of delivery methods when combined with learning style inventories. This study explores these relationships.

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CHAPTER 3
METHODOLOGY
Research Design

The design of this research is a randomized, complete block design. The key factors are Kolb's learning styles and two delivery methods. Blocking was used to account for potentially different groups of students. Response variables are the achievement score gain and the study time. An initial test produced learning style inventories. Random assignment of delivery method was conducted within each of Kolb's learning styles (as determined by Marshall and Merritt's LSQ-SD). Additionally, demographic questions were designed to identify characteristics of the sample, and to seek relationships between key factors and these demographics.

Sample/Settings

The sample consisted of undergraduate college students enrolled in introductory hospitality classes at Kansas State University, Oklahoma State University, Iowa State University and the University of Missouri - Columbia. A telephone conversation was made to obtain tentative commitment with each university. A telephone conversation requesting formal permission from the instructors of the introductory courses to conduct this study was made. A formal letter followed (Appendix A).

Pilot Test

A quasi-pilot test consisting of 20 individuals was conducted at Kansas State University in the summer of 1998 to evaluate and enhance the instruments and procedures. The experiment was not a true pilot test, because the four weeks did not lapse between the pretest and posttest. A module consisting of customer-service lessons in a hotel, front-desk setting was used. Since the video-lecture was produced to simulate the existing interactive multi-mediated (CD-ROM) version, specific attention was given to the quality and consistency of the video-lecture through a review by content specialists at Kansas State University. Two content specialists reviewed the parallel in content between video and CD-ROM. Revisions were made accordingly. The summary of responses, the procedures and the interpretations of data were submitted to the dissertation committee for final approval prior to conducting the main study.

Initial Selection

During the 1998 fall semester, all students enrolled in selected Introductory Hospitality Management courses at their respective universities were asked by their instructors to participate in the study. Students were given the option of participating in the study for class credit, or performing an alternative assignment to be defined by the instructor of the course. This study did not evaluate the alternative assignments. Initial briefing instructions and the Human Subjects Review Board acceptances are illustrated in Appendix B.

Phase I

Students that consented to participate in this study were asked to sign a consent form (Appendix B). Participants were asked to complete the preliminary questionnaire, Marshall and Merritt's LSQ (Appendix C), and a 21 question examination (Appendix D) that served as a pretest and posttest. The preliminary questionnaire included demographic questions to determine gender, class, age, ACT, or GPA. The pretest/posttest was a multiple-choice examination derived from the multimedia UPFRONT! module prepared by the Educational Institute. This pretest was administered by the instructor of the course.

Results were sent to Kansas State University for interpretation. The examinations were scored and the data recorded. The results of analysis placed students into one of four inventory groups according to their LSQ category interpretation score. Students in each of the learning style quadrants were randomly assigned to one of the two delivery methods: video-lecture or multi-mediated instruction.

Phase II

The Primary Researcher assigned students to one of two delivery methods, after a period of three weeks. The Educational Institute (EI) permitted the use of their CD-ROM version of UPFRONT! Customer Service Training Program module. This module is a component of EI's Hospitality Certification Program and is recognized as the industry standard.

Each participant selected to use the CD-ROM was given a written copy of the module for preparation and also instructions for performing the software program (Appendix E). Software was installed on designated computers in common, accessible areas and was available for use during specified hours. Students could view the module on their own computers. Students were then asked to track total study time dedicated towards completing the module. Each module included a chart to record start-times and stop-times of preparation and performance. Students were permitted to take notes. Questions regarding the instructional material and technological support were answered via telephone and electronic mail. The use of written instructions, telephone and electronic mail for support was intended deliberately to simulate a distance education environment.

The remaining half of the student sample received a video-tape of a recorded lecture demonstrating the identical UP-FRONT! content which was also delivered on CD-ROM. Each student was given a written copy of the module and also instructions for studying the video-lecture (Appendix F). Video units were available for preparation use. Students viewed the lecture as they wished. Students recorded their total study time spent on this module; the written instruction sheet for the module included a chart to record the start-times and stop-times of study and preparation. Students were allowed to take notes.

Phase III

A posttest was administered to all students, three weeks after the initial test in phase I, and one week after the administration of the delivery method in phase II. This test was identical to the prior examination, with an additional question querying total study time. The decision to give a written examination to all participating students was an effort to attain equality in the experiment. Additionally, the decision of the primary researcher to administer phases II and III was in an effort to provide unbiased results among all students in recording their study times.

Instruments

The learning style inventories were determined by Marshall and Merritt's LSQ-SD. The LSQ-SD contained voluntary demographic questions of classification in college, gender, age, ACT score and GPA. The written examination (pretest and posttest) contained 21 multiple choice questions and was based on the test in the UPFRONT! CD-ROM module (Appendix D). The multimedia module consists of interactive customer service lessons. The linear video was recorded specifically to simulate the material and experience of a lecture format. The validity of the video-lecture and test was determined by two content specialists. Kuder-Richardson's test for reliability was reported for all achievement tests (see Table 6.1).

Analysis of Data

A two-factor analysis of variance under a randomized block design was used to analyze factors: LSI categories and delivery methods, and response variables: study time, achievement gain and the other selected non-categorical variables on the questionnaire. Friedman's Test was used to analyze data outside of the statistical normalities. Chi-square analysis, Pearson's R and Spearman's Test were performed on the remaining categorical demographic variables. Chi-square and Spearman's tests are included in the articles, (chapter's 4 and 5) and Pearson's R test is included in chapter six. Kuder-Richardson's test for reliability was performed using Kansas State University's proprietary Grader Software System. All other data were employed for calculations utilizing the Statistical Analysis System (SAS, version 6.12) computer software.

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CHAPTER 4

Effects of LSI and Delivery Methods on Achievement Gain and Study Time

Abstract

This study compared the roles of D.A. Kolb's learning style inventories (LSIs) between two delivery methods. Pre- and posttests monitored achievement gain (AG) and study time (ST). The two delivery methods included video-lecture (VL) and interactive multimedia (IM). The sample consisted of undergraduate students enrolled in introductory hospitality courses at four Midwestern land grant universities. LSIs and delivery methods (DMs) had no significant effect on AG. No significant differences were found between the DMs based on LSI. Significant differences were determined between the DMs based on ST. Post hoc comparisons suggested a difference in ST between DM at lower age levels.

Introduction

Futurists predict that technology will play an increasingly important role in hospitality programs (Kasavana, 1993). Several institutions of higher education offer programs that involve various levels of technology. As technology enters the classroom and distance education increases in importance, students, teachers and administrators need assurance that learning needs can be met through the use of technology (Freeman, 1995). Therefore, evaluation will continue to be a critical component of the improvement process (Cyrus, 1997). To date, only a limited number of studies have investigated the achievement rates of technologically advanced delivery methods. This study investigates this area.

Learning Style Inventories

Kolb employed Witkin's field dependence/independence theory for determining cognitive styles with the Kolb's Learning Style Indicator. Kolb's aim was to develop a more applicable psychological theory. A four-stage learning process was derived from the experiential learning model of Dewey. This model emphasized the importance of experiential learning, using cognitive theory derived from the social psychology writings of Bruner and Piaget (Paulson, 1993). The model utilizes a continuous learning cycle of experience (Kolb,

1984A). Its four stages are: 1) the learner has a concrete experience; 2) the concrete experience is the basis for observation and reflection; 3) the observations are assimilated into an idea or theory from which implications for action can be deduced; and 4) these implications serve as a guide in acting to create new experiences. Thus, the cycle evolves (Kolb, 1973).

Kolb's theory suggests a model. A questionnaire is administered to determine two composite scores. These two scores include the relative amount of abstraction or concretion in the processing of one's learning (Abstract Conceptualization - Concrete Experience), [AC-CE]; and the relative degree of action or reflection (Active Experimentation - Reflective Observation), [AE-RO]. The AC-CE and AE-RO scores are then plotted vertically and horizontally, respectively, on a graph and a dominant learning style is determined (Figure 4.1). Convergents' (CONV) strengths lie in finding practical uses for ideas and theories; divergers' (DIVE) strengths lie in viewing concrete situations from many different points; assimilators' (ASSIM) strengths lie in placing large amounts of information into theoretical models or logical order; and accommodators' (ACCOM) strengths lie in hands-on experience or in the carrying out of plans (Kolb, 1976).

Insert Figure 4.1 about here

Kolb proposed that a well-integrated learner would use all four modes, although most learners develop only one of these modes most effectively due to hereditary and societal experiences. Kolb's LSI theory (1976) stated that individual learners of virtually any age will use varying combinations of knowledge-building approaches depending on the situation and the personality of the individual. Kolb stated that individual learners must also have the abilities that are opposite of their strengths in order to be effective. For example, learners with an ACCOM style must be proficient in ASSIM.

Kolb's LSI model has been employed as an instrument in many studies determining learning style. It is commonly used in many fields, including the hospitality profession. In the past, it was reported that learning styles assessed by Kolb may be relatively stable over a fairly long time, thus refuting learning style shift theories (Tamaoka, 1985). Furthermore, Hsu (1999) stated that Kolb's LSI model may be used to adequately determine a learning style, focus on the strengths and build non-dominant areas.

However, one limitation of Kolb's LSI instrument is its statistical characteristics, in that it is an ipsative measurement. Ipsative format categorizes learners into a LSI quadrant with no magnitude of intensity. This means that the degree of individual responses may not be compared with others (Marshall & Merritt, 1984). To overcome this statistical challenge, Sharon Marshall and Jon Merritt (1984) conducted reliability and construct validity studies on both Kolb's Learning Style Instrument and an alternative (normative) instrument called Marshall and Merritt LSQ-N. This new instrument was designed to profile Kolb's

original LSI instrument by using an alternative, normative evaluation in its survey. The object of a normative tool is to compare continuous results of data among different studies. The alternative LSQ (LSI-N) used the word list identical to that of Kolb. In order to make it normative, respondents were asked to rate each word, according to preference, as it was characteristic of their individual learning style. The normative, four Likert-scale choices were: characteristic, somewhat characteristic, somewhat uncharacteristic, and uncharacteristic. This altered the word list to statistically accommodate normative evaluation, therefore enhancing its statistical capabilities.

The LSI-N was found to support construct validity in some of the LSI items, unlike Kolb, but lacked cross-validation (Merritt & Marshall, 1984). To combat this statistical challenge, Marshall and Merritt (1985) performed another study comparing the LSI-N and a revised LSQ comprised of the same word list. This revised LSI instrument had an increased structure for response and was called the learning style inventory semantic differential form (LSI-SD). Each word was contrasted with a theoretically opposite word according to the learning style. For example, the concrete experience word "accepting" was contrasted with the theoretically opposite word "questioning." Respondents were asked to rate their views consistent to their learning on a five-point Likert scale. The Likert scale was modified by allocating points to words previously assigned to Kolb's original scale. The LSI-SD was administered to a sample of 181 of the 343 undergraduate subjects that received the original LSI-N to determine the alpha reliabilities. Statistical results of the study were very successful regarding

validation and reliabilities. The structure was consistent with Kolb's learning style model but with moderately higher scale reliabilities. Estimates of internal consistency reliabilities were based on the use of an alpha coefficient. LSI-N reliabilities varied from 0.546 to 0.725 and LSI-SD scale reliabilities varied from 0.608 to 0.861. All four LSI-SD scales received higher reliability when compared to the LSI-N. This study suggested that valid normative forms of Kolb's LSI instrument are achievable and therefore can be implemented into use for studies (Marshall & Merritt, 1985).

The LSI-SD has been used with success in other studies. Hsu performed three studies using the LSD-SD. Hsu (1989) performed a national study using the LSI on foodservice managers. Hsu continued work with the LSI-SD in a seven-year longitudinal study of hospitality undergraduates (Hsu, 1998); and continued with a similar study on LSI shifts (Hsu, 1999). Paulson (1993) implemented the LSI-SD in the evaluation of a quantity food production study at Iowa State University. Fincher (1995) implemented the LSI-SD to examine initial retention on psychomotor and cognitive achievement among health students.

Field Research of Delivery Methods

Video cassette technologies are commonly used as instructional tools in education. The use of video has made great advancements in education since it has been considered a low-cost alternative and is readily available in most classrooms, dormitories and student apartments. The drastic price reduction of video cassette players in the late 1970's offered linear video at a low cost with

increased freedom for many distance learners (Hilliard, 1978). This provided learners with low-cost, high quality visual and audible instruction. Broadcasts were other means of video-lecture instruction. These broadcasts have served as a popular alternative delivery method in many educational settings (Duke, 1983).

During the late 1970's through the 1980's, the personal computer replaced the mainframe as the primary computer tool. The invention of the Altair 8800 can be credited with the evolution from mainframe to personal, or desktop, computing (Ranade & Nash, 1994). As the integration of personal computers developed and prices decreased, the software provided increasingly better quality production tools. Video was equipped to accommodate two-way communication between computers or an outside agency. This entailed a computer interface, which is currently the newest form of multimedia (Lawlor & Weber, 1997).

The comparison of delivery methods is not new. The literature provides numerous examples of comparisons ranging from written instruction through computer-based training. Dewey (1938) described matching learners with types of instruction. Studies began with lantern slides in the 19th century, advanced to television and eventually to computer-based learning. A majority of the pre-computer-age studies, however, were conducted in the 1950's and 1960's. The recent integration of multi-mediated technology into education has yielded contemporary studies that have explored new dimensions. The general rationale for interest in learning style studies in computerized self-instruction is due to the fact that significant differences have been found in certain studies while other studies have found no significant differences.

Researchers have found that computer-assisted instruction (CAI) is as effective as traditional teachers or other media. Jameson, Suppes and Wells (1974) conducted an early survey of literature in an effort to determine the effectiveness of alternative instructional media. Subjects learned effectively from all media: traditional classroom instruction, instructional radio, instructional television, programmed instruction and CAI . No significant differences in achievement were observed. It should be noted that CAI did reduce students' learning time within the classroom (Jameson, Suppes and Wells, 1974).

Garrison stated that CAI has feedback capabilities powerful enough to compare to those of a teacher. Garrison went on to state that "after 25 years of research it can be concluded that CAI can be a more efficient or effective means of instructional delivery than traditional face-to-face instruction" (Garrison, 1985, p.238). Chung (1991) boldly stated, "If one lesson has been learned by researchers in instructional technology conducting media comparison studies, it is that the medium is NOT the critical factor in student learning" (Chung, 1991, p.40). Batey and Cowell (1986) stated, "good teaching is good teaching, whether the teacher and learner are in close proximity or are at a great distance from each other" (p.16). Clark (1983) performed a meta-analysis of mediated instruction: no significant differences were found among the media. Clark stated that consistent evidence supported the generalization that there are no learning benefits to be gained from any specific medium to deliver instruction (Clark, 1983).

However, results of other studies have found alternative conclusions. Two substantial studies were found to strongly suggest differences between DMs. Liao (1998) performed a 35-study meta-analysis, concluding that the effects of hypermedia compared to traditional instruction were positive. Hake (1998) compared interactive-engagement (E-I) versus traditional methods on introductory physics courses to over 6000 students. The achievement gain results strongly suggested that the use of E-I can strongly enhance the effectiveness of similar mechanics courses, well beyond that obtained through traditional methods. Sixteen other smaller, mediated comparison studies used learning style inventories as a factor in determining test achievement. Six studies concluded that some type of significant difference may be attributed to individual learning styles, while the remaining ten found no significant differences.

Overall, the research findings have yielded inconclusive relationships between learning styles and delivery methods. The literature offered relatively few studies regarding the contrast of learning style preferences (LSIs) combined with delivery methods (DMs). No two studies were found to be identical and outcomes varied significantly. Few of the studies surveyed were found to investigate both the initial-test and the delayed-test achievement of delivery methods. This study explored these relationships.

Research Design

Four hypotheses of the study include:

Hypothesis #1: Achievement Gain (AG) is not an effect of DM and LSI

Hypothesis #2: Study Time (ST) is not an effect of DM and LSI

Hypothesis #3: Demographics are not significantly associated to ST or AG

Hypothesis #4: ST is not significantly associated to AG

The sample consisted of undergraduate college students enrolled in introductory hospitality classes at four midwestern land grant universities. The study used a randomized complete block design with blocking between universities. The independent variables were the scores on a modified Kolb's LSI (Marshall and Merritt's LSQ-SD) and the delivery method, and the dependent variables were AG and ST. AG was defined as the difference between pretest and posttest scores, and ST was defined as the total amount of time that students viewed and/or studied the material in preparation for the achievement test (posttest). An initial pre-selection of LSI using Marshall and Merritt's LSQ-SD was performed, and a random assignment of delivery method was conducted within each LSI quadrant. Additionally, demographic questions were designed for the descriptive purpose of identifying the sample.

Instruments

This study used an LSQ-SD, a preliminary questionnaire, two delivery methods with instruction sheets and an achievement test. Marshall and Merritt's LSQ-SD was used to determine students' learning styles. A preliminary

questionnaire was created to obtain Age, ACT score, and GPA. The DMs consisted of a CD-ROM and a video-lecture. The Educational Institute permitted the use of their CD-ROM version of UPFRONT! - Customer Service Training Program module. This served as the interactive multimedia (IM) delivery method. A professional video-lecture was manufactured to contain identical information and served as the video-lecture (VL) delivery method. It contained an identical script given in a lecture format. Instructional sheets accompanied each module and included blanks to record start and stop viewing and study times. A 21-question achievement test was abstracted from the multi-media module's test bank. This served as both a pretest and posttest.

Phase I

Students enrolled in introductory hospitality courses at the selected universities were asked to complete both the preliminary questionnaire, a pretest and the LSQ-SD. Results were sent to Kansas State University for interpretation. Results were used to randomly assign students into one of four inventory groups according to their LSI category. Students in each of the four quadrants were then randomly assigned to one of the two delivery methods: video-lecture or interactive multimedia.

Phase II

After a period of three weeks, students were briefed on a delivery method and given written instructions. Half of the students received a CD-ROM module.

Software was installed on designated computers in accessible areas and was made available for use during accommodating hours. Students could view the module on their own computers. The remaining students received videotape of a recorded lecture. Video stations were made available for students who could not view the video at other locations. All students were asked to record total study time required to complete the module on a form provided. Questions regarding the instructional material and technology support were answered via telephone and electronic mail.

Phase III

A posttest was administered to students four weeks after the pretest in phase I. This date was exactly one week after the administration of each delivery method in phase II. This test was identical to the prior examination, with an added question regarding total study time. The primary researcher administered phases II and III directly in an effort to provide unbiased results among students recording study-time.

Analysis of Data

The data were analyzed using a two-factor, randomized complete block design with blocking between the four universities. Learning styles were determined by Marshall and Merritt's LSI-SD. Statistics were performed on LSI and demographic variables using Statistical Analysis Software (SAS) version 6.12. Correlation was performed utilizing Spearman's test for relationships.

Analysis of variance was performed utilizing "Procedure Mixed Test" for normal bell-curve distributions. Chi-square analysis was used for categorical data. An alpha value of .15 was established due to the experimental nature of the field study. A minimum university response rate of 40% and a minimum overall response rate of 50% were established.

Results

Students that were not in attendance for any of the methodology phases were excluded from the study. Despite this, the learning styles were relatively evenly distributed among students after study attrition. This provided comparable blocks within each of the treatments (Table 4.1). Delivery methods were randomly assigned to participants within each learning style, and numbers remained constant despite participant attrition throughout the study.

Insert Table 4.1 about here

A 21-question examination served as a pretest and a posttest. Pretest, posttest and achievement gain (AG) scores as well as study times (ST) are displayed in Table 4.2. The mean AG was 2.15 and 2.07 for interactive multimedia and video-lecture, respectively. A significant difference was not detected. The mean ST was 44.72 and 38.78 minutes, for interactive multimedia and video-lecture, respectively. A significant difference was detected.

Insert Table 4.2 about here

Hypothesis #1: Achievement Gain (AG).is not an effect of DM and LSI was rejected. Table 4.3 shows that no significant differences in AG were found between different LSIs ($p=.831$) or DMs ($p=.488$). This finding suggests that students learned equally, regardless of LSI and DM combined, as well as separately. Therefore, students can obtain or learn similar content material using IM or VL technology at equal achievement rates without regard to LSI. This finding is supported in previous literature (Jameson, 1974; Clark, 1983; Batey, 1986; Chung, 1991; Nam, 1995).

Insert Table 4.3 about here

Hypothesis #2: Study Time (ST) is not an effect of DM and LSI was rejected. No significant difference in ST was determined among learning styles ($p=0.464$). A significant difference in ST was determined between DMs ($p=0.090$) [Table 4.4]. A post-hoc comparison using a test of least-squared means displayed approximately seven minutes difference between DM suggesting that students spent significantly more ST on the IM module (Table 4.5). This finding may be because of the interactive nature of the IM instrument. Students may spend more time maneuvering throughout the module due to its many dimensions.

Insert Table 4.4, Table 4.5, and Figure 4.2 about here

To examine this further, DMs were compared with demographic characteristics. "Age" was found to be a significantly different factor in ST. Students at 18, 19 and 20 years spent more time completing the IM DM. A tendency to regress toward the mean causes no significant difference at all higher age levels (figure 4.2). Literature did not provide an explanation for this, however, the newness and interactive nature of IM may have caused certain students to spend more time on the module. Academic environment may contribute to this equation. It may also be reasonable to speculate that younger students were more accustomed to viewing and retaining VL, resulting in a lower study time.

Hypothesis #3: Demographics are not significantly associated to ST or AG, was rejected in part. Table 4.6 examines the correlations found between variables. ST was not significantly related to any of the demographic variables. This suggested that Age, ACT, and GPA have no effect on the AG of hospitality students within the study. AG was significantly, but mildly, related to AGE ($p=0.083$; $r=0.112$). AG was associated to age implying that older students are mildly associated better learners. This may suggest an association that should be further investigated. AG was significantly, but mildly, negatively associated to

ACT score ($p=0.059$; $r=-0.127$). This finding, although weak in relationship, may imply that ACT scores are an indicator of success for students using VL and IM DMs.

Insert Table 4.6 about here

Hypothesis #4: ST is not significantly associated to AG, was supported. Students' ST was not significantly ($p=.89$) related to AG (Table 4.6). Some students may have been faster learners than others; however, no statistically significant difference between AGs was found. Therefore, the students' amount of total time-on-task is not a good indicator of achievement. This finding is supported in the literature (Truelson, 1995).

This study has drawn conclusions. However, it should be noted that the study was limited in that data were collected from four predetermined universities. Results may not be generalized beyond these universities, although hospitality educators can use the LSI-SD as a benchmark for similar studies at their universities. Also, despite the observed serious intent of the students with respect to the study, demographic data was self-reported.

Conclusions and Recommendations

This study answered many important research questions. No significant difference was found between means based on AG due to the effects of DM and LSI. No significant relationship was determined between ST and LSI. However

a significant difference was detected between ST and DM. Further investigation showed that students spent more time completing the IM module and that age played a role in that DM. No significant difference was detected between STs and demographic variables or AG. Significant but mild correlations were detected between AG and age, and AG and ACT.

These findings agree with similar studies that found marginal or no differences in LSIs among ST, DMs or demographic variables, (Chin, 1992; Pollard & Kizzier, 1992; Anderson, 1993; Truelson, 1995). However, it should be noted that results are different from other very reputable studies (Buergermeister, 1989; Jia, 1992; Hake, 1998) that have found substantial differences in LSIs among DMs and demographic variables.

The study's findings have direct application in education. Advisors and educators can consider these findings and make adjustments accordingly. This study has suggested that VL can be used as effectively as IM with no significant effect on AG or LSI. Therefore, teachers can use either delivery with increased confidence in its ability to deliver a consistent lesson. ST was not affected by LSI. This implies that students of different LSIs require relatively equal amounts of time to complete lessons. This makes the LSI instrument a poor screening tool for ST. It is recommended that educators not use this tool as an indicator of ST. However, DMs were significantly different among STs. Students took longer to complete IM rather than VL coursework to achieve comparable results. Educators should consider this when planning distance education classes. It was also determined that age and ACT were both mildly related to AG.

Educators and academic advisors should consider this when screening students for technology-integrated education courses.

The literature is inconclusive and incomplete. This study, as well as others, is limited to students in their respective populations. New technologies and student profiles are currently being developed. Future studies should explore the possible relationship between Age and ST with regard to DMs. This may explain a portion of attrition in distance education. It is also recommended that future studies involving these and additional delivery methods be conducted to provide a better understanding of the learning process. It is through this type of essential research that we share our findings and help facilitate student learning.

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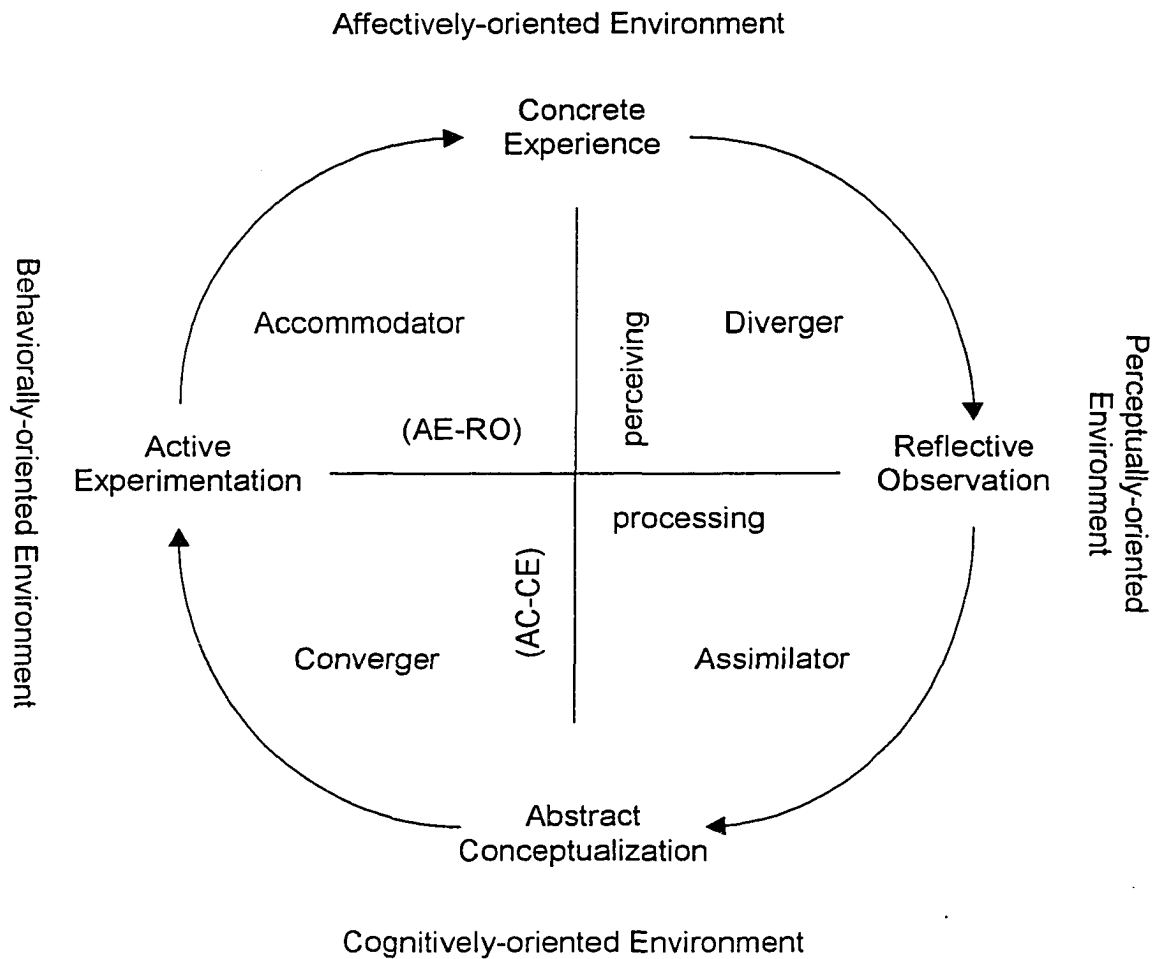


Figure 4.1. Kolb's learning style model. Note. Adapted from Learning Style Inventory: Self-scoring Inventory and Interpretation Booklet Kolb, D.A. (1984). Boston, MA: McBer and Company, (p.6)

Table 4.1
Distributions of LSIs by DMs

Learning Style	N					
	Total	%	VL	%	IM	%
Assimilator	79	35.11	41	36.28	38	33.92
Accomodator	54	24.00	31	27.43	23	20.54
Diverger	33	14.67	14	12.39	19	16.96
Converger	59	26.22	27	23.89	32	28.57
Total	225	100.00	113	100.00	112	100

Note. DM = delivery methods; VL = video-lecture; IM = interactive multimedia

Table 4.2
ST and AG of DM

Delivery Methods	<u>Total Study Time</u>			<u>Pretest</u>		<u>Posttest</u>		<u>Achievement Gain</u>		
	n	Mean	SD	Mean	SD	Mean	SD	n	Mean	SD
Interactive Multimedia	112	44.72	26.28	18.6	1.6	16.46	2.18	115	2.15	2.07
Video-lecture	119	38.78	28.19	18.6	1.44	16.22	2.04	122	2.40	2.11

Table 4.3

LSI by DM with Response Variable AG

Source	NDF	SS	MSE	F-value	P-value
School	3	0.696	0.023		
LSI	3	3.976	1.325	0.29	0.8309
DM	1	2.194	2.194	0.48	0.4878
LSI * DM	3	14.672	4.891	1.07	0.3640
Error	207	946.116	4.571		
Total	217				

Note. AG = achievement gain; DM = delivery method

Table 4.4

LSI by DM with Response Variable ST

Source	NDF	SS	MS	F-value	P-value
School	3	0	0		
LSI	3	1979.4226	658.808	0.86	0.464
DM	1	2224.9320	2224.932	2.90	0.090
LSI*DM	3	1818.3060	606.102	0.79	0.503
Error	203		767.218		
Total	213				

Note. ST = study time; DM = delivery method

Table 4.5

Least-Squared Means of ST by DM

DM	LSMean	Std. Error	Similarities
IM	45.16	2.80	A
VL	38.31	2.89	B

Note. ST = study time, DM = delivery methods; IM = interactive multimedia;
VL = video-lecture

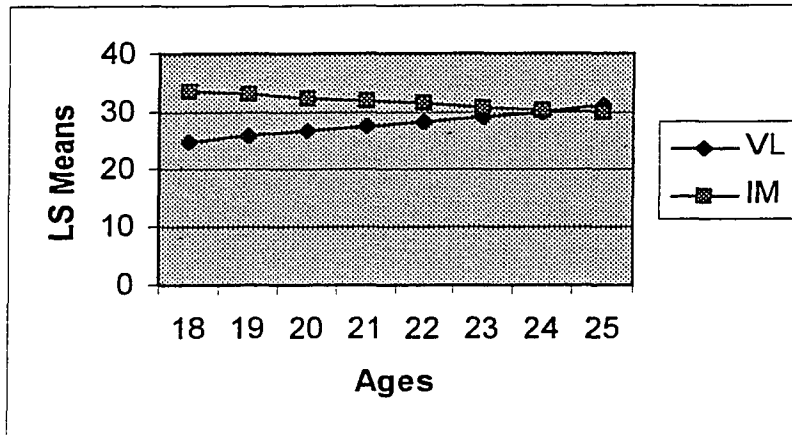


Figure 4.2. Least Squared Means of ST by DM; VL = video-lecture; IM = interactive multimedia; DM = delivery method

Table 4.6
Spearman's Test for Correlation Relationships

		Posttest	ST	AGE	ACT	GPA	AG
Pretest	(r-value)	0.38809	0.01130	-0.08677	0.17815	0.13532	-0.65029
	(p-value)	0.00010	0.86400	0.17580	0.00740	0.04350	0.00010
	(n)	238	232	245	225	223	238
Posttest	(r-value)		0.00157	0.05068	0.07278	0.08062	0.39922
	(p-value)		0.98100	0.43650	0.28250	0.23690	0.00010
	(n)		232	238	220	217	238
ST	(r-value)			0.05642	-0.02233	0.07206	-0.00375
	(p-value)			0.39240	0.74470	0.29750	0.95470
	(n)			232	215	211	232
AGE	(r-value)				-0.14936	-0.23443	0.11256
	(p-value)				0.02510	0.00040	0.08310
	(n)				225	223	238
ACT	(r-value)					0.32874	-0.12731
	(p-value)					0.00010	0.05940
	(n)					208	220
GPA	(r-value)						-0.07270
	(p-value)						0.28630
	(n)						217

Note: Highlighted = $p \leq .15$

CHAPTER 5

Learning Style Inventory and the Demographics of Hospitality Students

Abstract

This study examined learning style preferences of undergraduate students enrolled in introductory hospitality courses at four Midwestern land grant universities. Learning style Inventory (LSI) was analyzed with respect to demographic variables: class, gender, age, ACT score, and GPA. LSI was only an effect of one of the five demographic variables. No significant difference was determined between gender, class, age and ACT score, by LSI. A significant difference was found associating GPA and LSI. Students with a Diverger LSI had lower GPA. Demographic findings and LSI distributions were compared to other studies. Results of qualitative analysis revealed that both similarities and contrasts exist between LSIs.

Introduction

Researchers have believed that students learn differently. Some people have appeared to learn from listening and conceptualizing, and others have preferred to learn from concrete experiences. However, most educators disagree on what constitutes an optimal method of learning. The processes of attaining and retaining information, or learning styles, have been studied by social scientists for a number of years (Stevens, 1985; Fincher, 1995). Educators still strive to accommodate the needs of individual learners. A survey of LSI and demographic variables is readily available to educators. There is a

belief that these factors can be used as indicators of other outcomes such as achievement (Paulson, 1993) and study-time (Truelson, 1995). Though some of this research has been conducted within the area of hospitality management, further studies are still warranted (Hsu, 1999).

Learning Style Inventories

D.A. Kolb believed that individuals, because of hereditary equipment, past experiences, and the demands of their present environment, develop individual learning styles. Kolb developed a more applicable psychological theory that utilizes a four-stage learning process. The model was derived from the experiential learning model of Dewey that emphasized the importance of experiential learning, using cognitive theory derived from the social psychology of Bruner and Pingein (Paulson, 1993). The model utilizes a continuous learning cycle where experience generates a concept that guides an individual's decisions through new experiences (Kolb, 1984). This is called the experiential learning model. There are four stages of this cyclical model: 1) The learner has a concrete experience; 2) the concrete experience is the basis for observation and reflection; 3) the observations are assimilated into an idea or theory which suggests implications for action; and 4) these implications serve as a guide in acting to create new experiences. Thus, the cyclical model evolves (Kolb, 1973).

Figure 5.1 displays the quadrants of Kolb's LSI. Convergers' (CONV) strengths lie in finding practical uses for ideas and theories; divergers' (DIVE) strengths lie in viewing concrete situations from many different points; assimilators' (ASSIM) strengths lie in placing large amounts of information into theoretical models or logical order; and accommodators' (ACCOM) strengths lie in hands-on experience or in the carrying out of plans (Kolb, 1976).

Insert Figure 5.1 about here

Seawall (1986) stated that Kolb's LSI may be used to adequately determine learning styles, to focus on students' strengths but to build up non-dominant areas. However, one criticism of Kolb's LSI instrument is its statistical characteristics, in that it is an ipsative measurement. Ipsative format categorizes learners into a LSI quadrant with no degree of intensity. This means that the degree of individual responses may not be compared with others (Marshall & Merritt, 1984).

Sharon Marshall and Jon Merritt (1984) addressed this criticism when they performed a study using a revised learning style questionnaire (LSQ) with the same word list. This revised LSQ, called the Learning Style Questionnaire Semantic Differential form (LSQ-SD), produces the same LSI quadrants, but with degrees determined by the Likert scale. Each word is contrasted with a theoretically opposed word according to the learning style. For example, the concrete experience word "spontaneous" is contrasted with the theoretically

opposed word “questioning.” Respondents are asked to rate their views with respect to these words, consistent with their learning, on a five-point Likert scale. Statistical results of the study were very successful and supported its valid use for future studies interpreting Kolb's learning styles (Marshall & Merritt, 1985).

The LSQ-SD has been used with success in other hospitality studies. Hsu (1989) performed a national study using the LSQ-SD on foodservice managers. Paulson (1993) implemented the LSQ-SD in the evaluation of a quantity food production study at Iowa State University, and Hsu (1997) published a longitudinal study of students at a Midwestern Land Grant university. Furthermore, the theoretical framework of Kolb has been referred to as being the most widely used theory in adult education (Fenwick, 1994).

Demographic Variables

Kolb (1976) stated that individuals may be influenced by their environments. Studies have shown that demographic variables may play a role in LSI (Paulson, 1993). Demographic variables are a barometer of an individual's environment. Most demographics are readily available to counselors and educators.

Demographic variables, however, have been found to play varying roles. Al-Badr (1993) studied age and gender, finding no significant difference among LSIs. Davis (1994) studied several demographic variables in relation to achievement gain (AG) and computer self-efficacy. Age and gender were not found to be significant indicators of AG, but were significant indicators of

computer self-efficacy. Berger (1983) studied age in relation to LSIs, finding significant relationships. Stevens (1986) studied generation gaps among LSIs. Four new learning styles were synthesized, based on ages. Paulson (1993) studied LSIs, age and gender as predictors of AG, reporting no significant relationships. Hsu (1999) studied class level in relation to LSIs, finding some significant relationships.

In summary, the literature is incomplete and inconclusive in its examination of demographic variables. Only a few demographics have been related to LSI and AG. These incomplete findings can reasonably support further research, and therefore, this research examines demographic variables.

Methodology

This study sought to address two research hypotheses:

- 1) LSI is not an effect of demographic variables: gender, class, age, ACT, or GPA; and
- 2) The LSI distributions of this study are equal to the LSIs in other studies.

The LSQ-SD and demographic questions were administered to all consenting undergraduate students enrolled in introductory hospitality courses at four Midwestern universities during the fall semester of 1998. The findings were compared to three similar studies. All similar studies utilized Kolb's LSI (or Marshall and Merritt's LSQ-SD), included hospitality students, and had settings located in the Midwestern portion of the United States.

All four universities selected for this study were Land Grant institutions and were located in the Midwest. The introductory hospitality management courses were chosen for three reasons: 1) this type of course is common to all universities sampled; 2) students would be likely not to have pre-existing knowledge of the module's content; and 3) the test group represented the largest singular, cross-section sample of hospitality students available. A majority of the students were hospitality majors, although the study did not screen for students in-transfer and non-majors. All four courses evaluated were predominantly lecture-style and had only one section. Each course had only one instructor and had 80-120 students enrolled. The course was offered for three credit hours and one-credit hour at three and one universities, respectively.

Five self-reported demographic questions accompanied the LSQ-SD. Respondents reported classification in college level, gender, age, ACT or SAT score and GPA. All SAT scores were converted to ACT scores for comparison, using a conversion chart supplied by the American Association of Collegiate Registrars and Admissions Officers. All GPA's were based on a 4.0 scale.

The data were analyzed using a two-factor, randomized complete block design with blocking between the four universities. Learning styles were determined by Marshall and Merritt's LSQ-SD. Statistics were computed on learning styles and demographic variables using Statistical Software Analysis (SAS), version 6.12. Correlations were performed utilizing Spearman's correlation for associative relationships. Analysis of variance was performed utilizing "Proc Mixed" (SAS) when normal distributions were valid, and

Friedman's for non-parametric tests, otherwise. Chi-square analysis was used for categorical data. An alpha value of .15 was established due to the experimental nature of the field study. A minimum university response rate of 40% and a minimum overall response rate of 50% were established in an effort to obtain an adequate representation of the sample.

Results and Discussion

Response Rate and Demographic Data

Class sizes ranged from 80 to 120 students, and university response rates ranged from 48.28 to 65.83% (Table 5.1). A total of 245 usable questionnaires were collected from the four universities for an overall response rate of 57.78%.

Insert Table 5.1 about here

Table 5.2 summarizes demographic profiles of the participants. There were with slightly more females than males. Age was relatively equally dispersed among those 19 to 21 years of age with an expected tail towards older students, since students younger than 18 are not customarily enrolled in college-level courses. The ages of the population agreed with the findings of Hsu (1997). A majority of the students maintained a GPA between 2.5 and 3.5 on a 4.0 scale. ACT scores were relatively evenly dispersed, with over three-quarters of the scores falling between 19 and 26.

Insert Table 5.2 about here

Hypothesis#1:

The #1 hypothesis: LSI is not an effect of demographic variables: gender, class, age, SAT, or GPA, was rejected. LSI was not an effect of gender, class, age, and ACT; however, it was an effect of GPA.

Table 5.4 shows a Chi-Square analysis of LSIs within the study. No significant difference was found between learning styles between genders ($p=0.258$). The data suggested that males have no distinctly different LSI than females in this study. This result is different from classic studies conducted in other disciplines where patterns were suggested (Kolb, 1984; Smith and Kolb, 1986). Also, Berger (1983) had found that males were divided equally among learning styles and females were most often divergers and accommodators. This study does, however, agree with many recent studies of hospitality students (Hsu, 1999), as well as in other disciplines (Al-Badr, 1993).

Another recent issue is a theory that learning styles shift as individuals are exposed to varying situations. Some researchers have proposed that situations cause individuals to migrate or shift from one learning style to another (Ferguson, 1985). A study by Ferguson and Berger (1985) found that individuals with a low grade point average in a hospitality management curriculum shifted learning styles during a study (Ferguson & Berger, 1985). Hsu (1999) performed a similar repeated-measures study with undergraduate hospitality students at a

Midwestern Land Grant university. Mixed results were reported. Over a four-year period, students originally preferred and mildly migrated toward the CONV quadrant. Cohen (1997) performed LSI shift studies with other disciplines and his data did not support shifting of LSIs. No conclusive evidence has been found in the literature. Although this study is not longitudinal in scope, Table 5.3 reports that a Chi-square analysis of this study failed to show a significant difference between Kolb's LSI and classification: freshman, sophomore, junior, senior ($p=0.869$). Although it is only a single-measure, cross-section of LSI status between class-levels, this study fails to support the LSI shift theory. This result supports an alternative belief that LSI shifts only exist in theory and not in fact.

Insert Table 5.3 about here

Shapiro Wilks test statistic for LSI of age was 0.654 ($p=.001$). Shapiro Wilks test statistic for LSI of ACT was 0.952 ($p=.001$); and, its test statistic for LSI of GPA was 0.976 ($p=0.128$). The skewing of the data for (LSI) age and (LSI) ACT was somewhat anticipated due to the fact that students with lower ACT scores and ages are not enrolled in college level courses. As a result, Freidman's test was used on (LSI) age and (LSI) ACT (Table 5.4). (LSI) GPA was analyzed using Proc Mixed for two-way analysis of variance. Age and ACT scores were shown to have no significant differences among LSI ($p=0.924$; $p=0.984$). This suggests that age, contrary to anecdotal evidence and hearsay,

does not play a role in learning style. These findings also suggest that ACT scores are not significantly different among LSIs. This result agrees with the majority of all other learning style studies. Therefore, collegiate educators are advised not to use Kolb's LSI as a determinant of success. However, it should be noted that this study only evaluated college-age students that were predominantly 19-22 years of age.

Insert Table 5.4 about here

ACT scores and age were mildly and inversely correlated with one another ($r=-0.149$; $p=.025$). As a follow-up, Department Chairs of the universities were questioned to seek explanation. This further investigation suggested that universities in this study have admitted transfer students with lower ACT scores. High percentages of transfer students (37-65%) with lower ACT scores are a likely explanation for the age-related variation in ACT score. Another possible explanation is that these universities are currently attracting or admitting students with higher ACT scores than in the past.

Analysis of variance suggested that LSI and GPA are significantly different in this study ($p=.0054$). A post-hoc test of least-squared means among LSIs found that a significant difference from other LSIs existed with the DIVE learning style and GPA. Students with a lower GPA preferred the DIVE learning style. No significant differences were detected among the other groups (Table 5.5). Divergers' strengths lie in viewing concrete situations from many different points,

and they prefer to view situations in an affectively and perceptually-oriented environment. The diametrically opposite, but complementary learning style, CONV, has strengths in finding practical solutions for many ideas and theories and prefers to view situations in a behaviorally and cognitively-oriented environment. In other words, DIVE students, who prefer hands-on experience as opposed to lectures and reading, have a significantly lower overall GPA. This indicates that students who are found to have the DIVE learning style should be classified as high-risk students. Findings, however, are encouraging in comparison with Hsu's aforementioned 1999 shift study, where students who were originally found to be primarily DIVE, mildly migrated more towards CONV, and away from their complimentary learning style, DIVE.

Insert Table 5.5 about here

This conclusion parallels Berger's 1983 study as well as Hsu's 1997 study. Berger determined that a majority of the "A" students (38%) were accommodators and only 11% were assimilators. In contrast, the average "C" students were equal or lower in all categories except diverger, which almost doubled to 44%. Hsu (1997), in parallel, found that a majority of the students were convergers, who also had a significantly higher GPA. Convergers are the opposite of divergers. These parallel findings show a moderate trend among LSI studies involving hospitality students. In most cases, studies have shown students to have a lower GPA in DIVE, and a higher GPA in the opposite CONV.

Hypothesis #2:

Hypothesis #2: the LSI distributions of this study are equal to the LSIs in other studies was rejected. A review of literature revealed three other studies that profiled hospitality students' learning styles. Table 5.6 represents the distribution of learning styles in this and the similar studies. Berger (1983) used Kolb's LSI, while Paulson (1993) and Hsu (1997) used Marshall and Merritt's LSQ-SD. Paulson's results were averaged over two test outcomes on the same students. These studies have yielded both contrasting and comparable qualitative results. A visual assessment of the breakdown of learning styles in Berger and Paulson's studies show a near dichotomous relationship between DIVE and CONV proportions, with mixed relationships between ACCOM and ASSIM distributions.

This study reports a lower distribution (9%) in the DIVE quadrant. This was similar to Hsu's study (13%), but unlike Berger and Paulson's study which reported much higher distributions (33%; 40%). The ACCOM quadrant was moderately distributed (22%). Berger and Hsu's studies agree with this finding. Paulson reported a lesser percentage. The ASSIM quadrant was the most populated quadrant (35%). The other studies were consistently lower (17%; 17%; 19%). The CONV quadrant was moderately populated (24%). Hsu reported a greater population (38%), and Berger and Paulson reported lower populations (19%; 18%).

Insert Table 5.6 and Figure 5.2 about here

Visual differences in LSI distributions among studies may be attributable to at least three factors. The sample sizes are relatively low in number. Few studies are available, and limited variable statistics among studies do not allow a concise assessment. Additionally, the LSIs of hospitality students may be more sporadic than originally believed by other researchers (Berger, 1983); (Paulson, 1993); (Hsu, 1997). All of these conclusions imply that further wide-scale assessment is needed. For example, Johnson and Wales University has already begun to administer an LSI to all incoming students in its Hospitality College. Data such as this could significantly add to the understanding of patterns and associations among hospitality students (R. Brush, personal communication, March 22, 1999).

It should be mentioned that this study reports that approximately 9% of LSI scores fell on the horizontal or vertical axis and were excluded from categorical interpretation. Hsu reported that 5% fell on an axis and were excluded from the sample. Berger did not have this outcome because she employed Kolb's original, ipsative instrument. Paulson used the LSQ-SD, but did not report data of this type. Students falling on an axis are believed to have greater ability to adapt to the present learning environment on one of the two dimensions (Kolb, 1976).

The literature suggested that there is no ideal LSI. Kolb stated that well-integrated learners would use all four modes; therefore, no one learning style is better than another. Classic learning style theories suggest that most learners develop only one of these modes effectively due to past hereditary and societal experiences (Paulson, 1993).

Kolb's LSI (1976) stated that individual learners of virtually any age will use varying combinations of knowledge-building approaches depending on the situation and the personality of the individual. Individual learners must have the abilities that are opposite of their strengths in order to be effective. For example, learners with a CONV style need to be proficient in the DIVE style. Or, in a classroom situation, students strong in "hands-on" methods of instruction need to become more proficient in utilizing and applying theories. This allows the learner to adapt to various environments requiring different learning styles. Figure 5.2 shows a close cluster near the center of the axis with notably more (4.53%) on the lower AC-CE axis. This implies that a small percentage of students in this study have a moderate ability to use certain opposite strengths. These students, who perceive conceptually, have the ability to process information in a perceptual as well as behavioral manner. In other words, this group has the innate ability to use "reason" equally as well as a "hunches". This quality of the group is ideal according to Kolb because of its ability to adapt to varying environments. Educators can expect these select students to process equally well using both role-play as well as individual reading assignments.

However, it should be noted that this study was limited in that data were collected from four selected universities and that the overall response rate was only moderate at 58%. Results may not be generalized beyond these universities. However, hospitality educators can use the LSQ-SD as a benchmark for similar studies at their respective universities. Also, although students appeared to be serious with respect to the study, demographic data was self-reported.

Conclusions

This study answered two important hypotheses. Hypothesis #1 was rejected. LSI was only an effect of one of the five demographic variables. No significant difference was determined between gender, class, age and ACT score, by LSI. A significant difference was found associating GPA and LSI. Hypothesis #2 was also rejected. A qualitative assessment suggests that both similar and contrasting distributions exist. A visual assessment of the breakdown of learning styles in Berger and Paulson's studies shows a near dichotomous relationship between DIVE and CONV proportions, with mixed relationships between ACCOM and ASSIM distributions. In this study, students with DIVE learning style had a lower GPA. In other studies, the contrasting learning style, CONV, had higher GPAs. Comparisons also found that DIVE students shifted towards CONV over time. Additionally, a marginal negative correlation was found between ACT and GPA. When assessing the second hypothesis, some LSI proportions were visually different proportions in other studies. Differences in

distributions of CONV and DIVE were found, while AC and AS remained relatively consistent. A qualitative assessment of the breakdown of learning styles between this and similar studies shows both parallel and invert relationships between diverger and converger percentages. Consistency was found between accommodator and assimilator percentages.

Assessing, interpreting, and adjusting to LSIs can help students succeed in college. This study suggests that educators teach in a manner which will be complimentary to their individual, predominant LSI. Despite this, wide-scale future research is necessary to effectively establish LSI patterns. This study is only a glimpse of the overall learning picture. Some relationships and trends in studies have been drawn between LSI and GPA. It is suggested that future studies be conducted to piece together the puzzle of learning amongst hospitality students as well as students of all disciplines. It is only then that education can be delivered equally to all that wish to experience and obtain it.

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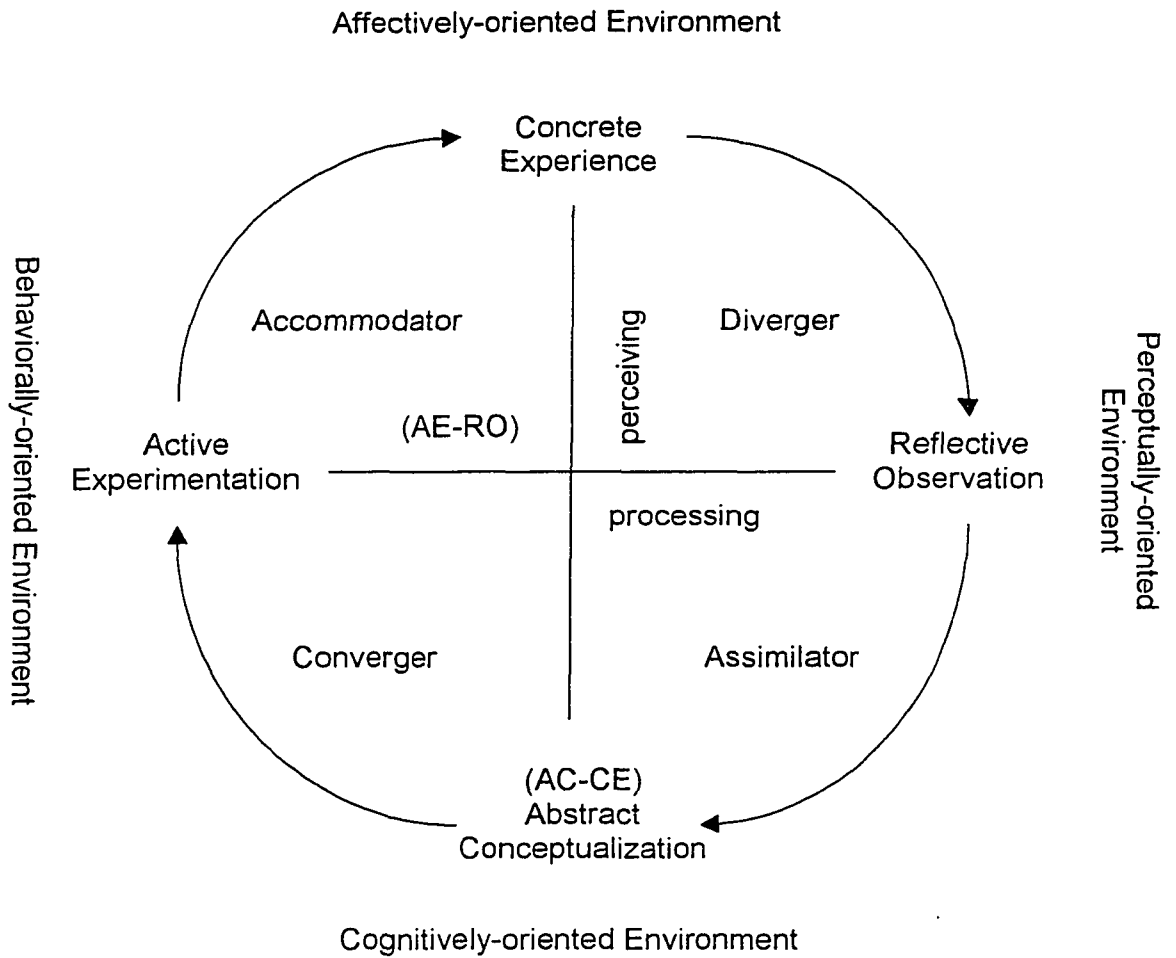


Figure 5.1. Kolb's learning style model. Note. Adapted from Learning Style Inventory: Self-scoring Inventory and Interpretation Booklet Kolb, D.A. (1984). Boston, MA: McBer and Company, (p.6)

Table 5.1
Student Response Rates

University	Total Enrollment	Usable	Response Rate
Univ. G	120	79	65.83%
Univ. H	80	43	53.75%
Univ. I	116	56	48.28%
Univ. J	207	67	62.62%
Overall Study	424	245	57.78%

Table 5.2
Demographic Characteristics of Students

Characteristics	N	Distribution
Gender		
Male	121	49.8%
Female	122	50.2%
Age		
18	41	16.7%
19	52	21.2%
20	51	20.8%
21	44	18.0%
22	28	11.4%
23	9	3.7%
24	7	2.9%
≥25	13	5.3%
Class		
Freshman	57	23.4%
Sophomore	74	30.3%
Junior	70	28.7%
Senior	43	17.6%
GPA		
<1.99	3	1.3%
2.00 - 2.49	39	17.5%
2.50 - 2.99	83	35.0%
3.00 - 3.49	77	34.5%
3.50 - 4.00	26	11.7%
ACT		
17	5	2.7%
18	11	4.4%
19	23	10.2%
20	23	10.2%
21	34	15.1%
22	16	7.1%
23	20	8.9%
24	24	10.7%
25	14	6.2%
26	25	11.1%
27	9	4.0%
28	10	4.4%
29	3	1.3%
30	5	2.2%
31	1	0.4%
32	2	0.9%

Note. N varies due to missing data

Table 5.3

Gender and Class by Learning Styles Inventories

Source	DF	Value	Sig.
Gender	3	4.037	0.258
Class	9	4.582	0.869

Table 5.4
LSI of Age, ACT and GPA

Response			Sum of			
Variable	Source	NDF	Squares	Mean Square	F-value	P-value
	School	3		53.208		
Age	LSI	3	17.200	5.733	0.16	0.9241
Age	Error	218	78118.715	358.343		
	School	3	65.217			
ACT	LSI	3	47.900	15.967	0.05	0.9843
ACT	Error	199		319.331		
	School	3		-		
GPA	LSI	3	2.646	0.882	4.35	0.0054
GPA	Error	199		0.203		

Table 5.5

Least Squared Means of Kolb's LSI based on GPA

<u>Learning Style</u>	<u>LSMean</u>	<u>Std. Error</u>	<u>Not Significantly Different</u>
AC	2.98	0.076	a
AS	2.91	0.068	ab
CO	2.94	0.075	ab
DI	2.60	0.078	c

Note. $p \leq .15$

Table 5.6

Comparison of LSI Between Hospitality Studies

Study	Total	Diverger		Accommodator		Assimilator		Converger	
		n	%	n	%	n	%	n	%
Berger (1983)	241	79	33	69	29	47	19	46	19
Paulson (1993)	66	26	40	9	14	11	17	12	18
Hsu (1997)	384	35	9	110	28	73	19	144	38
Bagdan (1999)	245	33	13	54	22	79	35	59	24

Note. Percentages in the chart were rounded. Values not totaling to 100% are attributed to undetermined LSI's.

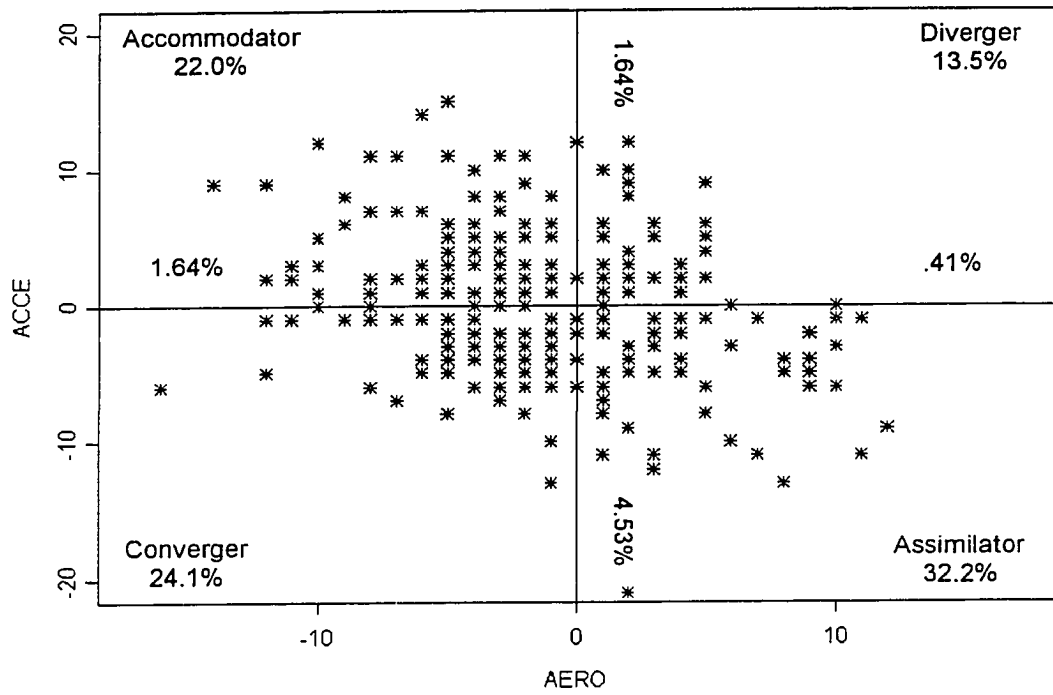


Figure 5.2 Distribution of LSI within study

CHAPTER 6

SUMMARY AND CONCLUSIONS

Introduction

This study investigated the relationships between learning styles, delivery methods and demographics among hospitality students. Literature shows that inconclusive relationships exist between these variables. A comprehensive review of the literature yields relatively few studies regarding the contrast of learning style preferences combined with delivery methods. No two studies are identical and outcomes vary significantly. Few studies have been found to investigate demographic variables. None of the studies surveyed were found to investigate both initial-test and delayed-test achievement of delivery methods when combined with learning style inventories. This study has explored these relationships.

The sample consisted of undergraduate students enrolled in introductory hospitality courses at four Land Grant institutions located in the Midwest. A learning style questionnaire - semantic differential (LSQ-SD) was used to determine students' learning style. Students were randomly assigned into delivery methods (DMs) involving interactive multimedia (IM) or video-lecture (VL). Both DMs were comprised of identical customer service lessons written by the Educational Foundation. Demographic variables measured were: classification in college, gender, age, ACT score and GPA. Primary response

variables included achievement gain (AG) and study time (ST). AG was determined by pretest - posttest gain, and ST was determined as the total amount of study time spent in completing the module and studying for the posttest.

The findings and implications of this study should assist hospitality (as well as other) educators in assessing relationships between the explored factors in order to improve their pedagogy. Demographic characteristics and achievement test summaries are provided for reference in chapter four. A Major Findings section provides a synopsis of the results in relation to the hypotheses. Conclusions and Implications include a review and discussion of the findings, limitations, and recommendations for future studies.

Demographic Characteristics

The university class sizes ranged from 80 to 120 students, and university response rates ranged from 48.28 to 65.83%. A total of 245 usable questionnaires were collected from the four universities for an acceptable overall response rate of 57.78%. Females than males were equally represented. Age was relatively equally dispersed among those 19 to 21 years of age, with an expected tail towards older students. A majority of the students maintained a GPA between 2.5 and 3.5 on a 4.0 scale. ACT scores were relatively evenly dispersed, with over three-quarters of the scores falling between 19 and 26.

Achievement Tests

The achievement tests were comprised of questions abstracted from a test-bank prepared specifically for the UPFRONT CD-ROM educational module, by the Educational Foundation of the American Hotel and Motel Association. The module and achievement questions are recognized as part of a national certification program. The video-lecture was constructed from a script of the CD-ROM module, and was evaluated and approved by two content experts for face validity. Kuder-Richardson's Test of Reliability on all achievement tests administered was found to be expectedly low (Table 6.1). Due to the nature of the study and the participating universities, module size, and test-length (21 questions) was limited. The low alpha value may be attributed to the low number of test questions. Preferably, a test with 50 or more questions would have been better suited for the study. It is strongly recommended that examinations be tested and approved for minimum levels of reliability prior to conducting future studies of this nature.

Additionally, Table 6.2 has been included to provide an overview of mean AGs and STs among universities. This table is separated to provide a summary of the individual university responses. Pretests scores ranged from 15.68 to 16.88 and Ags means ranged from 1.92 to 2.44. These similarities in Ags and STs allowed the study to collapse the data among universities in certain statistical tests. However, the universities were blocked to help eliminate differences between one another.

Table 6.1

Kuder-Richardson Test of Reliability on Achievement Tests

Test	N	K	SD	SE
Pilot Test	20	-0.06	1.59	1.64
Pretest-Combined	254	0.17	1.99	1.81
Posttest-IM	117	0.36	1.81	1.44
Posttest-VL	137	0.17	1.61	1.46
Posttest-Combined	254	0.26	1.70	1.46

Table 6.2
ST and AG of Universities

University	Total Study Time			Achievement Gain			Pretest			Posttest	
	n	Mean	SD	n	Mean	SD	n	Mean	SD	Mean	SD
A	78	39.83	28.55	79	2.61	2.25	79	15.68	2.39	18.29	1.70
B	41	46.85	40.59	43	2.51	2.44	43	16.49	2.30	19.00	1.23
C	56	42.09	20.33	56	1.98	1.75	56	16.88	1.48	18.86	1.39
D	57	40.07	18.67	60	1.92	1.83	60	16.58	1.89	18.5	1.50

Major Findings

The experimental hypotheses, and major findings related to each hypothesis, are summarized below:

Hypothesis #1A. Achievement Gain (AG) is not an effect of Delivery Methods (DMs).

Hypothesis #1B. Achievement Gain (AG) is not an effect of Learning Style Inventory (LSI).

No significant differences in AG between different LSIs ($p=.831$) or DMs ($p=.488$) were found. Mean AG was 2.15 and 2.40 for IM and VL, respectively. This finding suggests that students learned equally, regardless of LSI and DM, either separately or combined. Students can obtain similar material, using interactive multimedia (IM) or video-lecture (VL) technology, at equal achievement rates, without regard to LSI. The study failed to reject Hypothesis #1A and Hypothesis #1B.

Hypothesis #2A. Study Time (ST) is not an effect of DM.

Hypothesis #2B. Study Time (ST) is not an effect of LSI.

ST was affected by DMs, but not by LSI. ST was 44.72 and 38.78 minutes for IM and VL, respectively. No significant difference in ST was determined among learning style inventories ($p=0.464$). A significant difference in ST was determined between DMs ($p=0.090$). A post-hoc comparison of least-squared means denoted approximately seven minutes difference between the

two DMs, suggesting that students spent significantly more ST on the IM delivery method. To examine this further, DMs were compared with demographic characteristics. "Age" was found to be a significantly different factor in ST, at ages 18, 19 and 20 years. A tendency to regress toward the mean caused no significant difference at all higher age levels. The study failed to reject Hypothesis #2A but did reject Hypothesis #2B.

Hypothesis #3A. ST is not an effect of demographic variable Gender.

Hypothesis #3B. ST is not an effect of demographic variable Class.

Hypothesis #3C. ST is not significantly associated to demographic variable Age.

Hypothesis #3D. ST is not significantly associated to demographic variable ACT.

Hypothesis #3E. ST is not significantly associated to demographic variable GPA.

ST did not significantly affect demographic variables: class ($p=.9252$), and gender ($p=.8135$) [see Table 6.2]. ST was also not significantly related to any of the other demographic variables: Age, ACT, and GPA (see Table 4.5). These findings suggest that the demographic variables collected have no effect on the ST of hospitality students within the study. The study failed to reject #3A, B, C, D and E.

Table 6.3
ST and AG of Class and Gender

Source	NDF	W	Mean Square	F-value	P-value
<u>ST as a Response Variable</u>					
School	3				
Class	3	0.809129	52.9386	0.16	0.9252
Error	224		330.8660		
Gender	1	0.863039	19.8006	0.06	0.8135
Error	225		330.0100		
<u>AG as a Response Variable</u>					
School	1				
Class	3	0.947203	275.9502	0.83	0.476
Error	220		332.4702		
Gender	1	0.933153	270.7557	0.81	0.3679
Error	231		334.2661		

Note: W=Shapiro Wilke's test for Normality.
 All Wilke's tests had a p-value of .0001 suggesting a lack of normality.
 As a result, Friedman's Rank-Order Test was used as an F-test.

Hypothesis #4A. AG is not an effect of demographic variable Gender.

Hypothesis #4B. AG is not an effect of demographic variable Class.

Hypothesis #4C. AG is not significantly associated to demographic variable Age.

Hypothesis #4D. AG is not significantly associated to demographic variable ACT.

Hypothesis #4E. AG is not significantly associated to demographic variable GPA.

AG did not significantly affect demographic variables: class ($p=.4760$), and gender ($.3679$) [see Table 6.2]. AG was also not significantly related to demographic variable GPA, but was related, with mild correlation, to Age ($p=.0831$; $r=.1126$) and ACT ($p=.0594$; $r=-.1273$) [see Table 4.5]. Students appeared to increase AG with Age, implying that older students are better learners. Additionally, Table 6.3 reveals similar results using Pearson's Test for Linear Correlation. The study failed to reject Hypotheses #4A, B, and E, but did reject #5C and D.

Table 6.4
Pearson's Test for Correlation Relationships

		Posttest	Y-Coordinate	X-Coordinate	ST	AGE	ACT	GPA	AG
Pretest	(r-value)	0.37115	0.01664	0.01589	-0.02697	-0.06645	0.18532	0.12263	-0.73849
	(p-value)	0.0001	0.7955	0.8046	0.6828	0.3002	0.0053	0.0676	0.0001
	(n)	238	245	245	232	245	224	223	238
Posttest	(r-value)		-0.08472	-0.02127	-0.0499	0.10941	0.10024	0.07559	0.35201
	(p-value)		0.1928	0.744	0.4494	0.0922	0.1383	0.2675	0.0001
	(n)		238	238	232	238	220	217	238
Y-Coordinate	(r-value)			-0.29682	-0.00246	-0.01382	0.04938	0.0204	-0.08221
	(p-value)			0.0001	0.9703	0.8296	0.4611	0.7619	0.2063
	(n)			245	232	245	225	223	238
X-Coordinate	(r-value)				0.00444	-0.00624	0.05069	-0.10856	-0.03744
	(p-value)				0.9464	0.9226	0.4493	0.1059	0.5655
	(n)				232	245	225	223	238
ST	(r-value)					0.09195	-0.01964	0.05018	-0.00921
	(p-value)					0.1627	0.7747	0.4684	0.8891
	(n)					232	215	211	232
AGE	(r-value)						-0.12938	-0.09329	0.13993
	(p-value)						0.0526	0.165	0.0309
	(n)						225	223	238
ACT	(r-value)							0.32544	-0.11742
	(p-value)							0.0001	0.0823
	(n)							208	220
GPA	(r-value)								-0.0777
	(p-value)								0.2544
	(n)								217

Note: Highlighted = $p < .15$

Hypothesis #5. AG is not significantly associated to ST.

Students' ST was not significantly ($p=.9547$) related to AG. Some students may have been faster learners than others; however, no statistically significant difference between AGs was found. The study failed to reject Hypotheses #5.

Hypothesis #6A. LSI is not an effect of demographic variable gender.

Hypothesis #6B. LSI is not an effect of demographic variable class.

Hypothesis #6C. LSI is not an effect of demographic variable age.

Hypothesis #6D. LSI is not an effect of demographic variable ACT.

Hypothesis #6E. LSI is not an effect of demographic variable GPA.

LSI was only an effect of one of the five demographic variables. No significant relationship was determined between gender, class, age or ACT score, and LSI. A significant relation was found between GPA and LSI ($p=.0054$). A post hoc test showed that the Diverger (DIVE) LSI had a significantly lower GPA. This suggests that the DIVE LSI may signal a "high-risk" student. Therefore, the study failed to reject Hypotheses #6A, B, C, and D, but did reject Hypothesis #6E.

Hypothesis #7. The LSI distributions of this study are equal to the LSIs in other studies.

A qualitative assessment suggests that both similar and contrasting distributions exist. A visual assessment of the breakdown of the learning styles of similar studies shows a near dichotomous relationship between Diverger (DIVE) and Converger (CONV) proportions, with mixed relationships between

Accommodator (ACCOM) and Assimilator (ASSIM) distributions. Hypothesis #7 was rejected.

Conclusions and Implications

This study revealed many findings. This section synthesizes the study's findings into three sub-sections: delivery methods, learning style inventories, and qualitative assessments. The study's limitations, recommendations, and conclusions follow. The study's findings, recommendations and conclusions have direct application in education. Advisors and educators can consider these findings and make adjustments according to their pedagogy.

In review of the literature, current findings agree with similar studies that show marginal or no difference in LSIs among STs, DMs or demographic variables (Chin, 1992; Pollard & Kizzier, 1992; Anderson, 1993; Truelson, 1995). However, it should be noted that this study disagreed with other studies (Buergermeister, 1989; Jia, 1992; Hake, 1998) that have found substantial differences in LSIs among DMs and demographic variables.

Delivery Methods

The delivery method (DM) of video-lecture (VL) can be used as effectively as interactive multimedia (IM), with no significant effect on achievement gain (AG) or LSI. Therefore, teachers can use either delivery with increased

confidence in its ability to deliver a consistent lesson. Educators and academic advisors should consider this when screening students for technology-integrated education courses.

DMs had a significantly different effect on study time (ST). Students took longer to complete IM rather than VL coursework to achieve comparable results. Educators should consider this when planning distance education classes.

Learning Style Inventories

ST was not affected by LSI. This agrees with the findings of Truelson, 1995. This implies that students with different LSIs require relatively equal amounts of time to complete lessons. This makes the LSI instrument a poor screening tool for ST. It is recommended that educators not use this tool as an indicator of ST.

No significant relationship was found between LSIs and genders ($p=0.258$). The data suggested that males have no distinctly different LSI than females do in this study. This result varies from other studies (Kolb, 1984; Berger, 1983). Berger (1983), for instance, had found that males were divided equally among learning styles, and that females were most often divergers and accommodators. This study does, however, agree with many other more recent studies of hospitality students (Hsu 1999), as well as in other disciplines which minimize gender-based learning styles (Al-Badr, 1993).

ACT scores were not significantly different among LSIs but did relate mildly to age ($r=.13$). This result agrees with the majority of other learning style

studies. Furthermore, collegiate educators are advised not to use Kolb's LSI as a determinant of achievement success of these modules. However, it should be noted that this study evaluated college-age students that were predominantly 19-22 years of age. Therefore, age could still be a factor affecting different LSIs success in college (Hsu, 1997).

LSI and GPA are significantly related ($p=.0054$) in this study. A post-hoc test of least-squared means among LSIs, based on GPA, found that a significant difference from other LSIs existed, with the diverger (DIVE) learning style. Students with a lower GPA preferred the DIVE learning style. No significant differences were detected among the other groups. Divergers' strengths lie in viewing concrete situations from many different points, and they prefer to view situations in an affectively- and perceptually-oriented environment. The diametrically opposite, but complementary, learning style, CONV, has strengths in finding practical solutions for many ideas and theories and prefers to view situations in a behaviorally -and cognitively-oriented environment. As a result, DIVE students, who prefer hands-on experience as opposed to lectures and reading, may have a significantly lower overall GPA. Some findings, however, are encouraging, as in Hsu's aforementioned 1999 shift study, where students, who were originally found to be primarily CONV, mildly migrated more towards CONV, and away from their complimentary learning style, DIVE. If, in fact, LSI shifts do occur, this implies hope for the DIVE LSI. This conclusion parallels the findings of Berger (1983) and Hsu (1997).

Some researchers have proposed that situations cause individuals to migrate or shift from one learning style to another. Mixed results have been reported (Ferguson & Berger, 1985; Hsu, 1999). Although this study is not longitudinal in scope, a Chi-square analysis of this study failed to show a significant relationship between Kolb's LSIs and class levels: freshman, sophomore, junior, senior ($p=0.869$). In spite of the fact that this is only a single-measure, cross-section of LSI status between class levels, this study failed to support the LSI shift theory.

Qualitative Assessments

A qualitative assessment suggests that both similar and contrasting distributions exist. A visual assessment of the breakdown of learning styles, in Berger (1983) and Paulson's (1993) studies, shows a near dichotomous relationship between DIVE and CONV proportions, with mixed relationships between ACCOM and ASSIM distributions. In this study, students with DIVE learning style had a lower GPA. In other studies, likewise, the contrasting learning style, CONV, had higher GPAs. Additionally, a marginal negative correlation was found between ACT and GPA.

Visual differences in LSI distributions among studies may be attributable to at least three factors. The sample sizes are relatively low in number. Few studies are available, and limited variable statistics in these studies do not allow a concise comparison. Additionally, the LSIs of hospitality students may be more sporadic, and less CONV-dominated than originally believed by other

researchers (Berger, 1983; Paulson, 1993; Hsu, 1997). All of these conclusions imply that further wide-scale assessment is needed.

Limitations

This study has drawn many conclusions. However, it should be noted that the study was limited in that data were collected from four predetermined universities. Results may not be generalized beyond these universities, although hospitality educators can use the LSQ-SD as a benchmark for similar studies at their perspective universities. It should also be mentioned that Kuder-Richardson's alpha values were low. This may be attributed to the low number of questions (21) on the examination. This finding suggests that the results of the achievement tests are unstable. Also, despite the observed serious intent of the students with respect to the study, demographic data were self-reported.

Recommendations for Future Studies

Assessing, interpreting, and adjusting to collegiate pedagogy students' predisposed LSIs can help their success in college. This study suggests that educators should teach in a manner which will be complimentary to their students' individual, but predominant LSI. Different LSIs demand different pedagogical styles (but classes tend to have mixed LSIs). The literature on assessing and adjusting pedagogy to LSIs is inconclusive and incomplete. This study, like others, is limited to students in its respective population. New technologies and student profiles are currently being developed. Future studies

should explore the possible relationship between Age and ST with regard to DMs. This may explain a portion of the attrition in distance education. It is also recommended that future studies involving these and additional delivery methods be conducted to provide a better understanding of the overall educational process. It is through this type of essential research that we share our findings and help facilitate student learning.

It should also be mentioned that many instruments in hospitality as well as other disciplines of higher education currently employ examinations that are not sufficiently reliable. It is recommended that reliability tests be a pre-requisite for any and all major works. Without tests for reliability, test replicability, and assumptions are at risk.

This study is only a glimpse of the overall learning picture. Wide-scale future research is necessary to effectively establish LSI patterns. Some relationships have been drawn between LSI and GPA. It is suggested that future studies be conducted facilitate learning amongst hospitality students, as well as students of all disciplines. It is recommended that the LSQ-SD (or similar LSI) be administered to all students on matriculation, as currently done at Johnson and Wales University, to determine their predisposed LSIs and annually thereafter, to determine any LSI shift, if this seems helpful. It is only then that education can be delivered equally to all that wish to experience and obtain it.

Conclusion

The literature displayed inconclusive relationships between learning styles, delivery methods, study time and demographics. This study has explored these relationships, determining that VL can be used as effectively as IM, with no significant effect on AG or LSI. Also, ST was not affected by LSI. In contrast, DMs had a significantly different effect on ST. It was also determined that higher Age and ACT both correlate mildly to AG.

No significant difference of LSI was found between genders ($p=0.258$), class ($p=.0869$), Age ($p=.924$), and ACT scores ($p=.984$). A significant relationship was determined between LSI and GPA ($p=.0054$). Students with a lower GPA preferred the DIVE learning style. No significant differences were detected among the other groups. Divergers' strengths lie in viewing concrete situations. This indicates that students who are found to have the DIVE learning style should be classified as high-risk students. Another study that found students who are primarily CONV migrated towards CONV, and away from the complimentary (and problematic) learning style, DIVE.

A qualitative assessment suggests that both similar and contrasting distributions exist. A visual assessment of the breakdown of learning styles, in other studies, shows a near dichotomous relationship between DIVE and CONV proportions, with mixed relationships between ACCOM and ASSIM distributions. Visual differences in LSI distributions among studies may be attributable to at least three factors, including sample sizes, lack of available studies, and limited variable statistics in available studies. Additionally, the LSIs of hospitality

students may be more sporadic than originally believed by other researchers (Berger, 1983; Paulson, 1993; Hsu, 1997). All of these conclusions imply that further wide-scale assessment is needed.

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APPENDIX A
University Permission Request Letter

<Date>

Dear _____,

Delivery methods have been of particular interest to the hospitality industry, yet little is known about its effectiveness in test achievement among students. A study comparing the effect of learning style combined with delivery methods will be conducted during the fall semester of 1998. The purpose of this letter is provide more information about the study.

The Educational Institute has given permission for the use of their UPFRONT! multi-media module in this study. It is a quality introductory lesson on various aspects of customer service operations in a hotel setting and is available in two delivery methods or formats. Students will be randomly assigned to one of two formats. One format of the lesson is contained on a CR-ROM and requires a multimedia computer for use. The other format is a video-lecture which is contained on a VHS-formatted video-tape. I have included a copy of each for your viewing.

The study will require two twenty-five minute testing sessions (pretest and posttest), spaced three weeks apart and one out-of-class assignment (module) which we will distribute one week prior to the pretest. It is preferred that the sequence be administered towards the beginning of the semester; however, it may given later in the semester providing that the three-week sequence is followed. Test scores will be graded and promptly returned to you for use in your class. I have included a copy of the examination to help you plan your other lessons.

Results will be available to participants and reprinted in a dissertation by Paul J. Bagdan, and published in appropriate journals. We thank you for your initial commitment and look forward to working with you. I will be contacting you in weeks to come to discuss dates and details of the study. Should you have any questions, please contact me at, office: 785-532-2214, facsimile: 785-532-5522, or E-mail: pbagdan@ksu.edu.

Sincerely,

Paul Bagdan, M.S.
Ph.D.

Sincerely,

Carl Boger Jr.,
Committee Chair

APPENDIX B

Student Consent Letter and Initial Briefing Instructions

STUDENT CONSENT LETTER

My participation is purely voluntary. I realize that I may opt to perform the optional assignment. I understand that my refusal will involve no penalty or loss of benefits to which I am otherwise entitled and that I may discontinue participation at any time without penalty or loss of benefits to which I am otherwise entitled. If I have any questions about the rationale or method of the study, I understand that I may contact Paul Bagdan, (Kansas State University, 118A Justin Hall, Manhattan, KS 66506-1404; 785-532-2214). If I have further questions about the rights of subjects in this study or about the manner in which the study is conducted, I may contact Clive Fullager, Chair, Committee on Research Involving Human Subjects, (103 Fairchild Hall, Kansas State University, 66506-1404; 785-532-6195).

Name: _____
(print)

Signature: _____

Student i.d. number (if applicable): _____

INITIAL BRIEFING INSTRUCTIONS

Studies have shown that people learn different ways. This class has elected to become part of a study of introductory hospitality classes in four Midwestern universities: Oklahoma State, Iowa State, Kansas State, and the University of Missouri-Columbia.

A study from Kansas State University has taken a lesson that may normally be included in an introductory course this and has turned it into two formats: video and multi-media.

You will fill out the pretest packet. The first part will determine characteristics about you and your learning style, and the second part will help to establish a baseline of your background information (*i.e.: some of you may already have had exposure to a hotel setting and/or customer service.*)

In about three weeks, you will be given a lesson recorded onto a videotape or a CD-ROM. You will review it for one week and will be quizzed on the material at the end of the week.

The quiz will count towards class credit of **(to be decided by the instructor).**



Office of Research and
Sponsored Programs
103 Fairchild Hall
Manhattan, KS 66506-1103
785.532.6195
Fax: 785.532.5944

TO: Carl Boger
HRIMD
Justin Hall

Proposal Number: 1563

FROM: Clive Fullagar, Chair
Committee on Research Involving Human Subjects

DATE: July 14, 1998

RE: Proposal #1563, entitled "Effect of Multimedia and Video-Lecture Combined with Learning Style on Test Achievement."

The Committee on Research Involving Human Subjects has reviewed and approved the proposal identified above. In giving its approval, the Committee has determined that:

- There is no more than minimal risk to the subjects.
- There is greater than minimal risk to the subjects.

This approval applies only to the proposal currently on file and is effective for one year from the date of this memo. Any change affecting human subjects must be approved by the Committee prior to implementation. All approved proposals are subject to review, which may include the examination of records connected with the projects. Unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects and, if the subjects are KSU students, to the Director of the Student Health Center.

Prior to involving human subjects, properly executed informed consent must be obtained from each subject or from an authorized representative. Each subject must be furnished with a copy of the informed consent document for his or her personal records, and documentation must be kept on file for at least three years after the project ends. The identification of particular human subjects in any publication is an invasion of privacy and requires a separately executed informed consent. A copy of your informed consent documentation as approved by the Committee is enclosed.

APPENDIX C

Marshall and Merritt LSQ-SD

LEARNING STYLE QUESTIONNAIRE
Effects of Multimedia and Video-Lecture
Combined with Learning Style on Test Achievement

1) Name: _____

2) Student I.D.# _____

3) Check class level:

Freshman	Sophomore	Junior	Senior	Other (please explain)
[]	[]	[]	[]	[] _____

4) Gender:

Male	Female
[]	[]

5) Age: _____

6) ACT score: _____

7) Grade-point Average: _____

INSTRUCTIONS:

- Following is a list of 40 word pairs. For each pair, decide which one of the two words is more like your style of learning when compared to the other word. Then decide to what extent this word applies to your style learning. If it is **most of the time**, then **circle** the extreme response, **+2** on the right or the left, whichever is appropriate. If it is **over half the time**, but not most of the time, then **circle** the **+1** on the right or the left, whichever is appropriate. If you cannot decide between the two words, then mark **0**. Be sure to mark all the items.

Example

The word to the left
is characteristic of you.

The word to the right
is characteristic of you.

<----->

practical.. [+2]	[+1]	[0]	[+1]	[+2]	..logical
generally [most of the time]	over half the time	about half the time	over half the time	generally [most of the time]	

If you consider yourself **practical** rather than **logical** most of the time when processing information, then you would **circle** the extreme left **+2** choice.

Copyright 1985, Jon C. Marshall and Sharon L. Merritt, The University of Illinois at Chicago, College of Nursing, 845 S. Damen Ave., Rm. 539, Chicago, Ill. 60612-7350, Permission granted to P. Bagdan for exclusive and sole use in his research project.

LEARNING STYLE QUESTIONNAIRE

Circle the appropriate choice.

The word to the left
is characteristic of you.

The word to the right
is characteristic of you.



	[+2]	[+1]	[0]	[+1]	[+2]	
	generally [most of the time]	over half the time	about half the time	over half the time	generally [most of the time]	
1. spontaneous.....	[+2]	[+1]	[0]	[+1]	[+2]	..... questioning
2. sensing	[+2]	[+1]	[0]	[+1]	[+2]	..... thinking
3. premonition	[+2]	[+1]	[0]	[+1]	[+2]	..... reason
4. perceptual	[+2]	[+1]	[0]	[+1]	[+2]	..... intellectual
5. emotional	[+2]	[+1]	[0]	[+1]	[+2]	..... rational
6. impulsive	[+2]	[+1]	[0]	[+1]	[+2]	..... planning
7. feeling	[+2]	[+1]	[0]	[+1]	[+2]	..... thinking
8. intuitive	[+2]	[+1]	[0]	[+1]	[+2]	..... reasoning
9. perception	[+2]	[+1]	[0]	[+1]	[+2]	..... reason
10. hunch	[+2]	[+1]	[0]	[+1]	[+2]	..... logical
11. observation	[+2]	[+1]	[0]	[+1]	[+2]	..... participation
12. reserved	[+2]	[+1]	[0]	[+1]	[+2]	..... demonstrative
13. reflecting	[+2]	[+1]	[0]	[+1]	[+2]	..... performing
14. observing	[+2]	[+1]	[0]	[+1]	[+2]	..... doing
15. witness	[+2]	[+1]	[0]	[+1]	[+2]	..... exhibit
16. ponder	[+2]	[+1]	[0]	[+1]	[+2]	..... do
17. passive	[+2]	[+1]	[0]	[+1]	[+2]	..... active
18. view	[+2]	[+1]	[0]	[+1]	[+2]	..... execute
19. watching	[+2]	[+1]	[0]	[+1]	[+2]	..... acting
20. reflective	[+2]	[+1]	[0]	[+1]	[+2]	..... productive

LEARNING STYLE QUESTIONNAIRE

Circle the appropriate choice

The word to the left
is characteristic of you.

The word to the right
is characteristic of you.



	[+2]	[+1]	[0]	[+1]	[+2]	
	generally [most of time]	over half the time	about half the time	over half the time	generally [most of the the time]	
21. deliberative	[+2]	[+1]	[0]	[+1]	[+2]	.....impulsive
22. reason	[+2]	[+1]	[0]	[+1]	[+2]	.....hunch
23. analytical	[+2]	[+1]	[0]	[+1]	[+2]	.....emotional
24. planful	[+2]	[+1]	[0]	[+1]	[+2]	.....easily affected
25. logical	[+2]	[+1]	[0]	[+1]	[+2]	.....sentimental
26. thinking	[+2]	[+1]	[0]	[+1]	[+2]	.....instinctive
27. consider	[+2]	[+1]	[0]	[+1]	[+2]	.....impulsive
28. resolving	[+2]	[+1]	[0]	[+1]	[+2]	.....feeling
29. intellectual	[+2]	[+1]	[0]	[+1]	[+2]	.....emotional
30. evaluative	[+2]	[+1]	[0]	[+1]	[+2]	.....sensitive
31. operative	[+2]	[+1]	[0]	[+1]	[+2]	.....watchful
32. participation	[+2]	[+1]	[0]	[+1]	[+2]	.....observation
33. acting	[+2]	[+1]	[0]	[+1]	[+2]	.....reflecting
34. perform	[+2]	[+1]	[0]	[+1]	[+2]	.....examine
35. active	[+2]	[+1]	[0]	[+1]	[+2]	.....reserve
36. produce	[+2]	[+1]	[0]	[+1]	[+2]	.....look upon
37. involved	[+2]	[+1]	[0]	[+1]	[+2]	.....distant
38. doing	[+2]	[+1]	[0]	[+1]	[+2]	.....watching
39. solve	[+2]	[+1]	[0]	[+1]	[+2]	.....reflect
40. exercise	[+2]	[+1]	[0]	[+1]	[+2]	.....view

APPENDIX D
Pretest/Posttest Examination

Name: _____

Student I.D. Number: _____ Total Study-time: _____
(hours),(minutes)

Directions: circle the best answer.

1) Delivering quality service to guests:

- A) is your job.
- B) is part of your job.
- C) is only part of your job if you work in a guest-contact position.

2) If you come in contact with any object that might be contaminated by bloodborne pathogens:

- A) tell your manager and go to the hospital.
- B) take the contaminated object to the security department.
- C) wash your hands and affected skin areas immediately and report the incident to security.

3) Bloodborne pathogens are organisms that can carry infections such as:

- A) mumps and German measles.
- B) HIV and Hepatitis B.
- C) chicken pox and polio.

4) The dress code and personal appearance guidelines at your property require you to:

- A) use cologne, perfume, or aftershave.
- B) wear a clean, ironed uniform.
- C) have your uniform dry cleaned.

5) Safe lifting techniques include:

- A) bending at the waist to lift the object.
- B) placing your feet close together to maintain balance.
- C) keeping your back straight and using your legs to lift.

6) When you let the phone ring more than three times before answering, you give the caller the impression that:

- A) you are on another line.
- B) your property is very popular.
- C) you don't want to take the call.

7) If someone at your property looks dangerous or makes you feel uncomfortable:

- A) call your manager or the security department and ask for help.
- B) call the police.
- C) go up to him or her and ask him or her to leave the property.

- 8) To provide excellent service to a guest with a disability:
- A) provide pet treats for guide dogs.
 - B) ask the person questions to find out what he or she needs.
 - C) speak loudly and exaggerate your words.
- 9) If a guest with a vision impairment asks you for help:
- A) take the guest's right elbow and guide the guest around obstacles.
 - B) offer your left elbow to the guest and let him or her follow you.
 - C) take his or her guide dog's harness and lead the guest to the guestroom.
- 10) A broken window or a toilet overflow is an example of:
- A) a scheduled maintenance need.
 - B) a routine maintenance need.
 - C) an urgent maintenance need.
- 11) When you ride in elevators with guests:
- A) allow guests to reach their floors before going to your floor.
 - B) hold the door open for all the guests each way.
 - C) don't make guests uncomfortable with small talk and eye contact.
- 12) OSHA regulations require:
- A) guests with disabilities to be roomed on the first floor of the property.
 - B) guard rails and railings for all hallways, passageways, and stairs.
 - C) first aid training for all front desk employees.
- 13) Call the sender and ask that a facsimile (fax) be sent again if you:
- A) can't read one or more pages because of poor copy quality.
 - B) aren't sure the information on the fax is correct.
 - C) want an additional copy of the fax.
- 14) When you complete a task from a front office logbook entry:
- A) add another entry describing how and when you completed the task.
 - B) erase the entry or cross it out so no one else can read it.
 - C) write or type "done" and your initials next to the entry.

- 15) Front desk employees use an arrivals list to:
- A) plan their day's activities at the front desk.
 - B) alert security to guests who might cause the problems.
 - C) tell the restaurant how many meals to prepare.
- 16) If a guest has messages or mail waiting when he or she checks in:
- A) give the guest the messages or mail and ask him or her to sign the incoming mail logbook.
 - B) ask a bell attendant to place the messages or mail in the guest's room before the guest arrives.
 - C) tell the guest that the messages or mail will be delivered to his or her guestroom.
- 17) When handling guest mail, messages, faxes, packages, and telegrams:
- A) ask a bell attendant to deliver such to the guest's room immediately.
 - B) log the items in the incoming mail logbook when they arrive.
 - C) stamp the items with the date and time they were delivered to the guest's room.
- 18) If a guest comes to you with a special request:
- A) call the appropriate department for the guest and ask that department to handle the request.
 - B) ask another front desk employee to cover for you while you handle the request yourself.
 - C) give the guest the phone number of the department that can best help him or her.
- 19) When reporting an emergency to your property's PBX operator or security department representative, tell the person:
- A) what you were doing when the emergency occurred.
 - B) the names and room numbers of all involved guests.
 - C) your name, location, and the type of emergency.
- 20) Help guests reserve the best room for their needs by:
- A) learning the types of rooms at your property and their locations.
 - B) suggesting larger rooms.
 - C) suggesting higher-rate rooms.
- 21) Pay petty cash from your bank:
- A) when a guest pays for a safe deposit box.
 - B) when a guest needs change for the phone.
 - C) when accounting is closed and a cash purchase is required.

APPENDIX E
Multi-media Instructions and EI Permission Letter

Multimedia Instructions

Thank you for agreeing to participate in this study. The instructions are listed below:
 You will receive a CD-ROM (code number: _____)

Please return THIS SHEET and the CD-ROM when you take the examination.

INSTRUCTIONS: View the CD-ROM. This software is already installed on computers for your use in _____

- 1.) Enter CD-ROM into the CD-ROM drive.
- 2.) (If using windows 95) From the START menu, choose PROGRAMS, UPFRONT!, UPFRONT.EXE
- 3.) Choose NEW GUEST if this is your first time. Fill out the registration card as follows:

First Name: _____

Last name: _____

Department: _____

ID#: _____

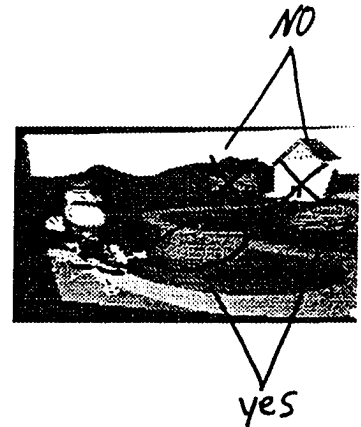
Password: _____ (You may need to re-enter password if a first user)

4.) This picture indicates 4 sections or "rooms" of the module. You may start, stop and review **ONLY** the **FIRST 2 ROOMS** of the module as you wish. Once you are inside a room, click on objects that are hyper linked. Click on the Buddy icon (lower right-hand corner of rooms) to change rooms. **DO NOT ATTEMPT TO ENTER THE THIRD ROOM OR THE EXAM.** (The module will block you out or not allow you to return if you should do so.) Additional support information is available inside the CD-ROM cover. You may take notes.

-record the **START TIME** and **STOP TIME** of viewing and studying on the form below. (Note: your instructor will not have knowledge of this)

-you will be tested on this material in 1 week. Plan your time accordingly.

-work independently



RECORD VIEWING AND STUDYING TIME BELOW

<u>START TIME</u>	<u>STOP TIME</u>	<u>TOTAL MINUTES</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

TOTAL MINUTES ALLOTTED TOWARDS VIEWING AND STUDYING _____

QUESTIONS: Contact Paul Bagdan at E-mail: pbagdan@ksu.edu or toll-free pager: 1-888-974-2951

**Department of Hotel, Restaurant, Institution
Management and Dietetics**

103 Justin Hall
Manhattan, Kansas 66506-1404
913-532-5521
FAX: 913-532-5522

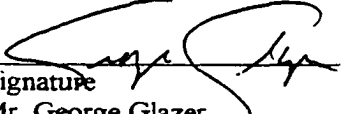
The Educational Institute will grant permission of the use of its CD-ROM multimedia and written instructional/testing versions of "UPFRONT! PERFORMANCE TRAINING FOR FRONT DESK EMPLOYEES" for Paul Bagdan's dissertation entitled, "EFFECTS OF LEARNING STYLES AND RETENTION WHEN USING MULTIMEDIA AND VIDEO INSTRUCTION". The research will be conducted from March 1998 through May 1999.

The Educational Institute will receive full authorship during the use of all of its materials.

The Educational Institute will be provided with a report of the findings regarding the study.

Additionally, the Educational Institute will receive a copy of any additional publications resulting from the study.

I have read and agree to the above statements and grant permission for the use of the specifically named publications for the use strictly stated above.

 _____ Signature	<u>GEORGE GLAZER</u> _____ Printed Name	<u>11-12-97</u> _____ Date
--	---	----------------------------------


Mr. George Glazer
Senior Vice President, Publications
Educational Institute
American Hotel and Motel Association
2113 N. High Street
Lansing, MI 48906

_____ Additional Authorized Signature	_____ Printed Name	_____ Date
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_____ Additional Authorized Signature	_____ Printed Name	_____ Date
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If you have any questions regarding this research, please contact me at (785) 532-2214 or (pbagdan@ksu.edu) or Dr. Carl Boger at (785) 532-2211 (bogerc@ksu.edu).

Thank you,



Paul Bagdan, M.S. - Graduate Student



Dr. Carl Boger, Ph.D. - Assistant Professor and Major Advisor

APPENDIX F
Video-Lecture Instructions

Video-Lecture Instructions

Thank you for agreeing to participate in this study. The instructions are listed below.

YOU WILL RECEIVE:

1-Video-lecture VHS cassette tape (code number _____)

Please return THIS SHEET and the VHS CASSETTE tape when you take the examination.

INSTRUCTIONS: In this study, you are asked to:

-view the video-lecture module. Machines are available in _____
You may start, stop, pause, rewind and review the video as you wish. You may also take notes.

-record the **START TIME** and **STOP TIME of viewing and studying** on the form below
(Note: your instructor will not have knowledge of this)

-you will be tested on this material in 1 week. Plan your time accordingly.

-work independently.

RECORD VIEWING STUDYING TIME BELOW

START TIME	STOP TIME	TOTAL MINUTES
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

TOTAL MINUTES ALLOTTED TOWARDS VIEWING AND STUDYING _____

QUESTIONS Contact Paul Bagdan at E-mail: pbagdan@ksu.edu
or toll-free pager: 1-888-974-2951