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A Study of Learning Style Theory in Teletechnet Graduate Courses at Old Dominion University

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A STUDY OF LEARNING STYLE THEORY IN TELETECHNET GRADUATE COURSES AT OLD DOMINION UNIVERSITY

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INTRODUCTION

Educational institutions are struggling to meet the demands placed on educators due to the increasing size of classes at colleges and universities and the increasing demand for continuing education from working adults. Technology and the distance or virtual classroom is becoming the method used to address the growing demands placed on educational providers. The use of technology is increasing at an accelerated rate as universities and colleges develop and deliver courses via interactive television and the Internet (Chepesiuk & Gorman, 1998). Various combinations of technology have been implemented in the traditional classroom ranging from electronic class discussions to web assignment systems (Jackson, Yorker and Mitchem, 1996). Pepperdine University, a leader in the move toward electronic communication, now offers an Educational Technology doctorate program almost entirely on-line (Talley, 1997). On-line education provides the opportunity for everyone to obtain post-secondary education (Cushman, 1995). Technology is without exception changing the environment of education.

Technology is viewed as a necessary part of the future of higher education because the traditional student is also changing. Only one-third of the student enrollment in Virginia in 1993 and 1994 were eighteen to twenty-three-year-olds. Increasingly older students are seeking continued educational opportunities. These adult students cannot commit to the standard four-year stay at a college or university, nor can they travel long distances on a continued basis to attend traditional classes. Old Dominion University, in Virginia, is using TELETECHNET to address the educational needs of the non-traditional adult student by providing undergraduate and graduate classes around the

country. TELETECHNET delivers classes primarily by interactive television, Internet, and e-mail instruction (Miller, 1995). This new technology is eliminating the constraints of time and space for the adult student. The use of technology to provide the adult student the opportunity for continued education is important. Technology provides educational opportunities where none had previously been available and is extremely valuable to the recipients. However, both educators and the educated must evaluate this new approach to education. What are the advantages and disadvantages of the non-traditional technology based classroom as compared to the traditional classroom?

The student in the traditional classroom has benefited from instruction based on learning theories. Learning theories such as multiple intelligence and learning style theory are valuable teaching tools in the traditional classroom (Silver, Strong, & Perini, 1997). There has been extensive educational research conducted to identify the effects of individual differences in learning style and academic achievement. Educational theorists generally agree that instructional strategies should be adapted to the individual student's learning style (Horton & Oakland, 1997). Therefore, several learning style inventories have been developed to evaluate an individual's preferred learning style.

The Myers-Briggs Type Indicator, the Dunn and Dunn Learning Style Model, and the Learning Style Inventory for Adults are instruments to aid the educator in the development of instructional strategies to implement learning style theory in the classroom (Horton & Oakland, 1997; Shaughnessy, 1998). Knowledge of students learning styles allows teachers to understand why particular instructional methods work for one student and not for another student and to apply the methods that work (Fatt, 1998). Instruction designed to address the differences in the way individuals learn is an

excellent approach to teaching both the adult and child student. Instruction based upon learning style theory can be somewhat easily integrated in the traditional classroom providing an optimal learning opportunity for all students regardless of personal learning style (Shaughnessy, 1998). Can effective learning theories such as learning style theory be effectively implemented in the non-traditional classroom? Will students in the technology-based classrooms such as TELETECHNET benefit from instructional strategies designed to address their individual learning style?

Statement of the Problem

The problem of this study was to determine whether the four learning styles of Sensing-Feelers, Sensing-Thinkers, Intuitive-Thinkers, and Intuitive-Feelers were accommodated in Occupational and Technical Studies TELETECHNET graduate courses at Old Dominion University.

Research Goals

The objectives of this study were to explore the following questions:

1. Whether the four learning styles outlined in the Leaning Styles Inventory for Adults (LSIA) can be accommodated in the non-traditional classroom with distance instructional delivery.
2. If all learning styles cannot be accommodated with distance instruction, which styles are more conductive to distance education?
3. If individual learning styles were accommodated, did accommodation of the individuals' learning styles facilitate a better learning experience for TELETECHNET graduate students?

Background and Significance

Learning style theory is based on the work of Carl Jung (Horton & Oakland, 1997). Learning theory focuses on the differences in the way individuals perceive, make decisions, and how active or reflective individuals are while interacting. Myers and Briggs expanded on Jung's work and developed the temperament typing of learning styles. Temperament typing by Myers and Briggs defines temperament with the four dichotomous traits of extroversion (E) and introversion (I), sensing (S) and intuition (N), thinking (T) and feeling (F), and judging (J) and perceiving (P). Keirsey and Bates expanded on the Myers and Briggs research and developed four basic temperament types derived by the interaction of these types. The SJ student values belonging and providing service to others. The SP types value personal freedom and spontaneity. The NT types value competency and the NF types value personal growth. The Myers and Briggs and Keirsein temperament theories have been expanded to describe prominent learning styles exhibited by students with coordinating temperament types and a preferred learning environment. The SJ student learns best with concrete instruction that is well planned and routine. The SP student learns best when instructional strategies include variety, entertainment, and action. The NT student learns best with instructional strategies that concentrate on concepts, theories, and discovery and experimentation. The NF student learns best with instructional strategies that focus on cooperation and personal application of learning for relevance to their individual lives (Horton & Oakland, 1997).

Jung's work was also integrated into the Learning Style Inventory for Adults (LSIA) developed for adult students by Silver and Hanson (1994). The LSIA focuses on the process of learning: how individuals absorb information, think about information, and

evaluate results. Theorists believe that learning is individualized thought and learning style theory emphasizes personality (Silver, et. al., 1997). The LSIA is a self-report inventory based on Jungain personality types that provides a qualified objective score using four dimensions. The LSIA identifies the individual's dominant preferred learning style and parallels the work of others in learning style theory. The four dimensions are Sensing-Feelers (SF), Sensing-Thinkers (ST), Intuitive-Thinkers (NT), and Intuitive-Feelers (NF). The SF learner is sensitive to others, searches for a strong emotional attachment to content, and sought warm relationships with classmates and teachers. The SF learner needs continual feedback and support. The ST learner needs a structured environment and focuses on the mastery of skills. The ST is an active learner using direct experience with all five senses. The NT learner needs an intellectually stimulating environment that promotes critical and analytical thinking. The NT sought explanations and challenging work. The NT presents their ideas in writing and precise oral argument as well as manipulation of symbol systems such as computer software. The final learning style is the Intuitive-Feelers (NF). The NF is creative and needs ways of expressing ideas and beliefs. The NF needs to share inspirations with others and explore possibilities of the future, of what might be (Silver & Hanson, 1994).

Silver and Strong (1997) give the percentages of people with strength in each of the learning styles. They propose that thirty-five percent of students are Interpersonal style (SF), thirty-five percent are Mastery style (ST), eighteen percent are Understanding style (NT), and twelve percent are Self-expressive style (NF) (Silver, et. als., 1998). The individual's learning style preference impacts motivation for learning, learning approaches, and teaching style preference (Booth & Winzar, 1993).

This preference is demonstrated because the closer the match between the student's learning style and the instructor's teaching style, the higher the grade point average. According to Rita Dunn, a leader in educational research on learning style theory, when instruction is delivered in a style that is different from the way the student learns, the student does not achieve all that they are capable of achieving regardless of additional resources such as films, manipulatives, tapes, or games. Knowledge of students' learning styles allows teachers to teach each student differently according to their individual style (Shaughnessy, 1998).

The implementation of instruction geared to the learning styles of students provided significant performance improvements. An analysis of forty-two experimental studies conducted between 1980 and 1990 by thirteen different institutions of higher education supports that students whose learning styles were accommodated in the classroom gained seventy-five percent of a standard of deviation more than students whose styles were not accommodated. A United States Department of Education four-year investigation also concluded that accommodating the learning styles of students had a positive impact on achievement (Shaughnessy, 1998).

These results are based upon instruction in the traditional classroom. However, the classroom is moving away from the traditional classroom to the classroom where students and faculty are no longer in the same room, or continent (Chepesiuk & Gorman, 1998). Will the non-traditional student in the distance classroom have the same learning opportunities as the traditional student? As stated, the purpose of this study is to determine whether learning style theory can be implemented and learning styles accommodated in non-traditional classrooms such as Old Dominion's TELETECHNET

graduate classes. The findings of this evaluation will assist educators in accommodating individual learning styles in the non-traditional classroom. Additionally, the findings may help to ensure that non-traditional students have the opportunity to benefit from instruction based upon the educational theory of learning styles.

Limitations

This study is limited to TELETECHNET graduate students in the Occupational and Technical Studies graduate program at Old Dominion University. A qualitative study of the perceptions and attitudes of Old Dominion graduate students was conducted for evaluation of courses televised during the fall 1998, spring, 1999, and Summer 1999 semesters. This author is forced to recognize several limitations in the data collection and analysis plan. The survey method imposes the limitation applicable to the use of only one instrument in the data collection plan. The instrument used in the qualitative study was subjective and limited by the degree of the respondent's understanding of their individual learning style, the application of learning style theory in instructional delivery, and any biases that may exist in the student-teacher relationship.

Assumptions

This study is based on the following assumptions:

1. The TELETECHNET classes were structured to include learning style theory.
2. The graduate students participating in the Occupational and Technical Studies graduate program are knowledgeable to varying degrees of learning style theory.

3. The graduate students participating in the Occupational and Technical Studies program are aware of their individual learning style.

These assumptions are based on course objectives of the mandatory Instructional Strategies class and the mandatory Adult Education class completed by Occupational and Technical Studies graduate students with course competencies inclusive of the knowledge and application of learning style theory.

Procedures

This study is based on qualitative analysis. The study is based on a structured closed question electronic survey. The survey was distributed to TELETECHNET graduate students in the Occupational and Technical Studies program at Old Dominion University. The results of the survey will be tabulated, compared, and interpreted. Recommendations for accommodation of the four outlined learning styles in the interactive televised classroom will be offered.

Definition of Terms

The following definitions are provided to assist the reader of this study:

Learning Style Inventory for Adults (LSIA): Learning Style Inventory developed for adults by H. Silver, R. Strong, and M. Perini.

TELETECHNET: Old Dominion University's Satellite Distance Education Program.

Overview of Chapters

Chapter I introduces the study to determine whether learning styles could be accommodated in the non-traditional classroom and more specifically whether learning styles were accommodated in Old Dominion University's TELETECHNET classes. An overview of learning style theory, specifically the Learning Style Inventory for Adults, and the significance of accommodating learning styles in the classroom was established. Research goals for the study were developed. The parameters of the study were identified, and assumptions, limitations, and procedures noted. A list of terms with definitions was provided.

Chapter II will present a review of pertinent literature. Chapter III will address the methods and procedures used in obtaining the information for the study. Chapter IV will report the findings of the study. Chapter V will present the summary, conclusions, and recommendations based on the findings of this study.

CHAPTER II

REVIEW OF LITERATURE

Before administering a questionnaire to the thirty Occupational and Technical Studies graduate students at Old Dominion University, the researcher reviewed literature on accommodating learning styles in the classroom. In order to understand the implementation of teaching/instruction based upon learning styles, it is helpful to become familiar with the educational theory of learning styles. The first part of this review will present information on accommodating learning styles in the traditional classroom. After reviewing learning styles in the traditional classroom, Chapter II will provide information on accommodation of learning styles in the non-traditional classroom by discussing the following studies conducted by Rita Dunn, Professor, St. John's University and St. John's University of Law, the Kentucky Educational Television ("KET") conducted at Paduccha Community College and Murry State University, and Georgia State University School of Nursing.

Accommodating Learning Style in the Traditional Classroom

Learning style theory is based upon the work of Carl Jung. Many educational researchers have been influenced by the work of Jung. Anthony Gregorc, Kathleen Butler, Bernice McCarthy, and Harvey Silver and J. Robert Hanson expanded on Jung's work and are some of the major researchers in the area of learning styles. These researchers have developed individual theories including instruments to measure personality traits to determine an individual's preferred learning style.

The interpretation of personality varies with all learning-style theorists. However, most theorists agree that learning style theory focuses on process and learning style

models and addresses how individuals absorb information, think about information and evaluate information. Theorists generally agree on the emphasis on personality and that learning is a personalized act of thought and feeling. The major theorists agree on four basic learning styles correlative to the LSIA, of Mastery (ST), Understanding (NT), Self-expressive (NF), and Interpersonal (SF) (Silver, et. als., 1997).

The benefits of learning style theory in education are numerous. Silver, Strong, and Perini (1997) advocate that the focus on the different ways individuals process information across content areas, the recognition of the role of cognitive and affective processes of learning for insight into motivational issues, and the emphasis on thought as an important component of learning for reduction of dependence on lower-level learning activities are the primary benefits of instruction based upon learning styles.

Insight into the benefits of accommodating the learning styles of students is also provided in a recent interview with Rita Dunn, Professor at St. John's University. Dunn was the coordinator of the Dunn and Dunn Learning Styles Model. The interview with Dunn addresses the benefits of testing students for their preferred learning style and implementing learning style theory in the classroom. Dunn advocates implementation of teaching/instruction conducive to individual learning styles based on her research in this area. She supports her advocacy of learning styles with a meta-analysis of forty-two experimental studies with the Dunn and Dunn learning style model between 1980 and 1990 by thirteen different institutions of higher education. Students who received instruction responsive to their learning styles could be expected to achieve seventy-five percent of a standard deviation higher than students who did not receive instruction based on learning style theory (Shaughnessy, 1998).

The value of learning style theory is supported with the conclusions of another study of forty statistics students. This study included traditional and non-traditional students in a traditional classroom setting. The findings show that three distinct learning styles emerged in the group of business students in the study. The three categories were visual, auditory, and tactile learning styles. The findings support that instruction that encompasses learning style theory is beneficial to all students. In addition, the study concluded that knowledge of the learning styles of non-traditional students would allow the instructor to address the shortcomings and difficulties that these students face. Bell (1998) argues that knowledge of students' preferred learning styles allows instruction to be oriented toward each student's learning style. The instructor can reach the majority of students by varying the instructional approach in the classroom (Bell, 1998).

The study also recommended that students can make better use of study time and are more successful with assignments outside of the classroom when they know their own learning style. The administration of a learning style inventory during the first class of a course can provide students with valuable information about their learning styles. One recommendation of the study was to provide students with a list of suggestions applicable to all learning styles after the completion of the learning style inventory in the first class of the course. This would provide both traditional and non-traditional students with valuable information about their learning styles and facilitate the success of their learning experience. These findings support that teaching/instruction designed to accommodate learning styles may assist the highly motivated non-traditional student who usually has numerous obstacles to overcome in their pursuit of education (Bell, 1998).

However, Dunn challenges the belief that motivation, concentration, completion of assignments, and supplemental independent studying would result in mastery for all students. A study conducted at St. John's University School of Law concluded that the single method of teaching is unlikely to be effective with all students due to the diversity of individual learning styles. Several previous studies conducted by Dunn documented that teaching methods and materials that matched learning style preferences provided significantly higher achievement. The study at St. John's School of Law concluded that no single method of teaching is responsive to all students; therefore, learning style assessments are recommended for determining which method will accommodate the learning styles of the largest number of students in a class. Boyle and Dunn (1998) suggest incorporation of a variety of teaching approaches for professors that do not assess the learning styles of their classes in an effort to accommodate the largest number of students. The extensive research conducted by Dunn in the traditional classroom supports the benefits of instruction based upon learning style theory (Boyle & Dunn, 1998).

A large body of research has been conducted in this area of educational theory and supports the overwhelming benefits of providing instruction designed to accommodate the learning styles of the majority of the students in a class. The available information on the traditional classroom and the implementation of instruction based upon learning style theory supports that accommodating learning styles provides the opportunity for a successful learning experience for the greatest number of students. However, the traditional classroom is rapidly becoming more technology based and the majority of

students seeking educational opportunities are non-traditional students. Can these benefits be provided to the non-traditional student in the non-traditional classroom?

Accommodating Learning Style in the Non-traditional Classroom

The traditional classroom is rapidly giving way to the technologically supported distance classroom. Some form of distance learning is provided to more than five million students of all ages by approximately two-thirds of all institutions of higher learning. According to the American Council of Education, sixty percent of public universities plan to expand their distance learning programs. More than 300 colleges now offer "virtual" degrees in fields such as engineering, nursing, business administration, and traditional liberal arts programs (Chepesuik & Gorman, 1998). The non-traditional classroom currently employs varying degrees of technology. Instruction is now provided by various combinations of satellite, interactive video-conferencing, and on-line technologies.

A distance learning program implemented at Paducah Community College in Kentucky used technology employed by business for video-conferencing to provide students real-time interaction with instructors. The Kentucky Educational Television (KET) program has been offering courses by television for more than twenty years. The instruction has been limited to standard TV classes until the introduction of interactive televised courses in 1990. The introduction of interactive classes is provided by connecting the community colleges to Murry State University by T1 telephone lines. This technology is the same technology used by businesses for video teleconferencing. The classrooms are equipped with three cameras that are trained on the students, on the teacher, and a copy stand to show books, transparencies, or other materials. The main

instructional advantage is that the technology allows real-time interaction between the remote sites and the main campus site (Feels & Patton, 1992).

The study conducted on classes completed in the fall of 1990 concludes that the instruction was just as effective, if not more effective, at the remote sites as the instruction provided at the main campus (Freels & Patton, 1992). Freels and Patton (1992) also note that the study revealed that instructors were more satisfied with their ability to see and talk to remote students in real-time. A careful notation is also made that the success of the instruction depended on teacher preparedness for this method of instructional delivery. These findings may suggest that learning styles can be accommodated in this real-time distance environment and provide the same opportunity to students as the traditional classroom.

Jackson, Yorker, and Mitchem (1996) provide additional insight on the accommodation of learning with the addition of electronic discussion to a traditional nursing course on cultural perspectives. Learning styles were addressed in a Georgia State University School of Nursing study using PUEBLO MOO, a virtual electronic environment housed in Phoenix, to integrate electronic discussion into a lecture/discussion class format. The program used a list serve to allow students to pose discussion questions and respond electronically. Georgia State also used a multiple user dimension called MOO. MOO is similar to a chat room. The access is through the Internet and includes a permanent textual description of the activity in MOO. This specific environment allowed electronic discussion in real-time and a permanent record of the discussion. MOO allowed students to transcend any barriers of face-to-face communication that can exist in the traditional classroom.

Jackson, Yorker and Mitchem (1996) state that the addition of this type of electronic discussion accommodated different learning styles. The textual and visual students did extremely well in the on-line class discussions but students who are auditory and visual experienced an initial disadvantage. The study indicates that the textual and visual learners excelled in the new environment and concludes that the addition of these components to any subject area can be achieved. However, an evaluation tool to support this finding of accommodating learning styles of these traditional students was not provided. The findings were based on traditional students and did not address learning styles SF, NT, and NF.

In addition, the majority of the student population is fast becoming the non-traditional student. Miller (1995) states that older students are seeking higher education. Less than one-third of students in Virginia, between 1993 and 1994, were full-time degree seeking students. The traditional undergraduate student is also changing. Approximately one-half of the new traditional students are concrete active learners. Miller (1995) states that, according to most educators, active learning works better than passive for most students.

Miller (1995) advocates that the active learner will flourish in the virtual classroom because they learn best from direct experience. These learners prefer structured and sequential teaching that engages their various senses and learning that begins with practice and ends with theory. The traditional classroom favors the abstract learner due to the immediate feedback and collaborative learning situations in the traditional classroom where quick response has always been rewarded. The virtual classroom will provide teaching in a variety of visual and auditory modes and permit

interaction among students as well as between the student and the professor. Miller (1995) suggests that selection criterion for the new generation of graduate students may need to be modified and the students socialized differently due to the changing classroom environment. Miller (1995) suggests that educators are addressing the fact that students perform better with instructional delivery that accommodates their preferred learning style in non-traditional classrooms.

The virtual or electronic classroom is assessable 24 hours and is changing the face of education. The Internet World Wide Web is altering the way instruction is provided to students. Educators are using on-line applications such as course schedules, examinations or test, class lectures, and connections to sites with additional resources for the course. The New Your State College of Human Ecology faculty members advocate that the Web has given them great power to do things visually. The time required to put the work on the Web being was viewed as the only downside (Powers, 1997). The prospective student now has continuous access to education in the solitude of his home without secession and socialization. However, making learning more human, not less human is the role of this new virtual classroom, according to Farrington and Eleey (1994).

However, some educators provide valid arguments associated with the important social aspects of education and the environment of the non-traditional classroom. Cushman (1995) provides additional insight into the social aspects of education with a critique of a paper by Margaret A. Miller on the use of information technology at universities and the new role of the professor. The changing educational environment is not all positive. Cushman (1995) provides both the negative and the positive aspects of

technology in education. He strongly suggests that the benefit of technology is to make a formal education available to individuals who otherwise would not have access and should be used in addition to face-to-face instruction. The increasing use of technology in education raises the concern that people may choose to receive their education at home in front of a machine. Cushman (1995) strongly argues that the necessary social aspects of education can be lost with the increased use of technology. Cushman, a college professor, states that each year when he asks his advisees what they would change about their undergraduate experience, the majority state that they would have liked more contact with their professors (Cushman, 1995). This brings to bear the point that students need individualized instruction and acknowledge that their individual needs are not met when teaching is not designed to address such things as individual learning styles.

Summary

Silver and Strong (1998) give the percentages of people with strength in each of the learning styles. They propose that thirty-five percent of students are Interpersonal style (SF), thirty-five percent are Mastery style (ST), eighteen percent are Understanding style (NT), and twelve percent are Self-expressive style (NF) (Silver, et. al., 1998). The student population is made up of students with all learning styles. The available information on learning styles in the non-traditional classroom addressed both the ST and NT learner. There was limited information available on addressing the needs of individuals with SF and NT learning styles.

The work of experts in the area of learning style theory suggest that the ST learner will do well in the new learning environment of interactive television and the Internet,

including adult students with a ST learning style. The abstract NT learner, accustomed to success in the traditional lecture environment, will have more difficulty with televised and Internet classes resulting in possible declining motivation. The NT learner will be intellectually stimulated in the technology based atmosphere but may lose the benefit of oral debate and subsequent analytical stimulation that comes from face-to-face discussion with professors and classmates. Also, the available research reveals all students desire some degree of social interaction in their educational environment, but the social interaction may be lost in the distance classroom. The SF learner is much attuned to the social aspects of learning. This suggests that the social SF learner who comprises thirty-five percent of students will be difficult to accommodate. The eclectic NF learner who is the minority of the student body, comprising twelve percent of the population, was not clearly addressed in the information available to the researcher.

The review of research on the educational theory of learning styles provides insight into the implementation of instruction based upon learning styles. This information, primarily positive with the educators seemingly energized with the future prospects of the increasing reliance on technology in educational delivery, provided valuable information for the possible accommodation of learning styles for the majority of students in all classrooms.

The benefits of learning style theory in the traditional classroom is evident based on the data available. However, the available information on actual evaluations of the effectiveness of instruction based on learning style theory in the non-traditional classroom was very limited. Also, the cumulative information in the area of accommodating learning styles in the non-traditional and virtual classrooms did not

support that all learning styles can be successfully accommodated. A study evaluating instruction based upon learning style theory in a non-traditional distance classroom may provide further evidence of whether all learning styles can be accommodated.

CHAPTER III

METHODS AND PROCEDURES

The problem of this study was to determine whether the four learning styles of Sensing-Feelers, Sensing-Thinkers, Intuitive-Thinkers, and Intuitive-Feelers were accommodated in Occupational and Technical Studies TELETECHNET graduate courses at Old Dominion University. A descriptive study was conducted in order to gain pertinent data relevant to the population. This chapter describes the research methods and procedures used to collect and analyze data from the Old Dominion University Occupational and Technical Studies TELETECHNET graduate program. Included in this chapter are sections on the population, instrument design, methods of collecting data, statistical analysis, and a summary.

Population

The population used in this study consisted of thirty-two Old Dominion Occupational and Technical Studies graduate students who completed TELETECHNET classes in the fall of 1998, spring of 1999, and summer 1999. The students were selected randomly from both degree seeking and non-degree seeking Occupational and Technical Studies graduate students. In addition, the students represent the Occupational and Technical Studies Concentrations of Community College General, Vocational Education, and Business and Industry Training. Twenty students participated in the study. All of the students completed the OTS course of OTED 788. The students completed OTED 785, OTED 760, OTED 761, OTED, and OTED 635 depending upon their OTS concentrations.

Instrument Design

In order to collect data relevant to the goals of the study, an instrument was designed utilizing the Likert Scale. Part I of the survey consisted of closed form questions based upon learning style theory designed to measure accommodation of the students' learning styles and personal and academic success achieved in the Occupational and Technical Studies courses. Part II contained an open-form question based upon the Learning Style Inventory for Adults (LSIA) designed to designate the learning styles of the students. The LSIA was completed by the students in the Occupational and Technical Education 788 course in the fall of 1998. A sample survey can be found in Appendix A. Five points were assigned to the response of strongly agree. Four points were assigned to the response of agree. Three points were assigned to the response of uncertain. Two points were assigned to the response of disagree and one point was assigned to strongly disagree. The instrument provided for the collection of data to address the following questions:

1. Whether the four learning styles outlined in the Leaning Styles Inventory for Adults (LSIA) can be accommodated in the non-traditional classroom with distance instructional delivery.
2. If not all learning styles can be accommodate with distance instruction, which styles are more conductive to distance education?
3. If individual learning styles were accommodated, did accommodation of the individuals' learning styles facilitate a better learning experience for TELETECHNET graduate students?

Methods of Data Collection

Data for this study was collected using a survey. The survey was distributed to thirty-two Old Dominion TELETECHNET graduate students who completed Occupational and Technical Studies courses in the fall of 1998 through the summer 1999. A sample cover letter for the survey can be found in Appendix B. The survey was distributed by electronic mail. The student's electronic mail addresses were provided by the Old Dominion Occupational and Technical Studies Department of the Darden College of Education. On August 27, 1999, the survey was distributed by student electronic mail to thirty-two OTS graduate students who completed TELETECHNET classes in the fall 1998 through the summer 1999. An additional attempt was made with a follow-up electronic mail on September 10, 1999.

Statistical Analysis

After the completed survey instrument was returned, a Likert Scale was used for the closed form questions to gather the students' responses. After tabulating the survey results, a mean value was calculated for each closed form response provided by the graduate students. The remaining open form survey question was reviewed and assigned frequencies. The results are reported in Chapter IV.

Summary

The research methods and procedures outlined include the population, instrument design, and methods for collecting data and statistical analysis. A survey was used as the research instrument in this study. Statistical data will be collected from the single research instrument and analyzed. The results of the statistical analysis will be discussed in Chapter IV.

CHAPTER IV

FINDINGS

The purpose of this study was to determine whether the four learning styles of Sensing-Feelers, Sensing-Thinkers, Intuitive-Thinkers, and Intuitive-Feelers were accommodated in Occupational and Technical Studies TELETECHNET graduate courses at Old Dominion University for the period of the fall 1998 through the summer 1999 semesters. Chapter IV presents the survey results in the form of tables and concludes with a summary of the results.

Response to the Survey

The survey was delivered to thirty-two OTS graduate students. Sixty-two percent of the students returned the survey.

Survey Results

The Occupational and Technical Studies survey was a two-part questionnaire. Questions one through nine were closed form questions dealing with accommodation of students' learning styles in the following courses televised in the fall 1998, spring 1999 and summer 1999:

Instructional Strategies and Innovations in Training and Occupational Education (OTED 788),

Trends and Issues in Occupational Education (OTED 760),

Foundations of Adult Education and Training (OTED 761), Curriculum Development in Occupation Education and Training (OTED 785),

and Research Methods in Occupational and Technical Studies (OTED 635). The second part of the survey is a single open form question designed to capture the learning styles present in the sample as designated with the completion of the Adult Learning Style Inventory in OTED 788.

Questions one and two were designed to measure whether the learning theory of learning styles was successfully taught and comprehended in OTS graduate classes. The first question sought to confirm that the learning theory of learning styles was taught in the OTS courses of Instructional Strategies and Innovations in Training and Occupational Education (OTED 788) and Foundations of Adult Education and Training (OTED 761). Table 1 showed twenty OTS graduate students or 100% of all respondents answered question one. The data reflected a mean of 4.4 for question one. This indicates that the students agreed that learning style theory was taught in the courses. The second question sought to measure how well the students comprehended learning styles theory in the OTS courses. Table 2 showed twenty OTS graduate students or 100% of all respondents answered question two. The data reflected a mean of 4.3 for question two. This indicates that the students also agreed that learning style theory was taught successfully in the courses.

Table 1
Survey Question 1

Sample: 20 Respondents or 100% Percent Response Rate

Question 1: The educational theory of learning styles was taught in the OTED 788 and OTED761 courses in the fall of 1998 and spring of 1999.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
11	6	3	0	0

Question #1	Mean	4.4

Table 2
Survey Question 2

Sample: 20 Respondents or 100% Percentage Response Rate

Question 2: I have a good understanding of learning style theory.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
7	12	1	0	0

Question #2	Mean	4.3

Questions three and four were designed to measure whether instruction in the OTS courses of OTED 788, OTED, 785, OTED 760, OTED 761, and OTED 635 were based upon learning styles theory. Question three sought to measure if the students felt the instruction in the above courses was varied to accommodate all learning styles. Table 3 showed twenty OTS graduate students or 100% of all respondents answered question three. The data reflected a mean of 3.75 for question three. This indicates that the students agree with this question. Question four sought to measure the level of instruction based on learning styles in the above courses by measuring the students' ease

in learning and success in transfer of the material. Table 4 showed twenty OTS graduate students or 100% of all respondents answered question four. The data reflected a mean of 4.1 for question four. This indicates that the students also agreed with this question.

Table 3
Survey Question 3

Sample: 20 Respondents or 100% Percentage Response Rate

Question 3: The instruction/teaching in the OTED 788, OTED 785, OTED 760, OTED 761, and OTED 635, was varied according to learning style theory.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
3	11	5	0	1

Question #3	Mean	3.75

Table 4
Survey Question 4

Sample: 20 Respondents or 100% Percentage Response Rate

Question 4: The instruction/teaching was delivered in a manner that made the information covered in the courses easy to understand and easy to apply to situations outside class.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
8	8	2	2	0

Question #4	Mean	4.0

Questions five, six and seven were designed to measure the distance learning components for accommodation of learning styles and the students' academic success with distance instruction compared to traditional classroom instruction. Question five addressed the specific components that were used in the OTS TELETECHNET courses

and sought to measure the benefits that may have resulted for distance students due to these components. Table 5 showed twenty OTS graduate students or 100% of all respondents answered question five. The data reflected a mean of 4.15 for question five. This indicates that the students agreed with this question.

Table 5
Survey Question 5

Sample: 20 Respondents or 100% Percentage Response Rate

Question 5: The distance instructional components such as interactive satellite, e-mail, and web based components helped in the understanding of the materials covered in the courses and made the classes more interesting.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
10	6	2	1	1

Question #5	Mean	4.15

Questions six and seven sought to measure effectiveness of the distance instruction by comparing academic achievement in the distance courses and traditional classroom courses. Table 6 showed twenty OTS graduate students or 100% of all respondents answered question six. The data reflected a mean of 3.65 for question six. This indicates that the students agreed that they had achieved at least the same level of academic achievement in the courses. Table 7 showed twenty OTS graduate students or 100% of all respondents answered question seven. The data also reflected a mean of 3.45 for question seven. This indicates that the students were uncertain that they achieved greater success in the courses than in traditional on-campus courses.

Table 6
Survey Question 6

Sample: 20 Respondents or 100% Percentage Response Rate

Question 6 : I experienced the same level of academic achievement in the Occupational and Technical Studies TELETECHNET courses as I have in the traditional on-campus courses.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
5	7	4	4	0

Question #6	Mean	3.65

Table 7
Survey Question 7

Sample: 20 Respondents or 100% Percentage Response Rate

Question 7: I experienced a greater level of academic achievement in the Occupational and Technical studies courses than I have in traditional on-campus courses.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
7	2	4	7	0

Question #7	Mean	3.45

Question eight measured the variable of motivation and sought to determine to what degree the academic success measured in questions six and seven was influenced by the opportunity OTS TELETECHNET distance program provides students to further their education. Table 8 showed twenty OTS graduate students or 100% of all respondents answered question eight. The data reflected a mean of 4.05 for question eight. This

indicates that the students agree that they would not have the opportunity to further their education without TELTECHNET courses.

Table 8
Survey Question 8

Sample: 20 Respondents or 100% Percentage Response Rate

Question 8: I would not have the opportunity to further my education without the opportunity provided by the Old Dominion TELETECHNET program.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
12	3	1	2	2

Question #8	Mean	4.05

Question number 9 was designed to assess the overall learning experience for the graduate students in the OTS courses of OTED 788, OTED 785, OTED 760, OTED 761, and OTED 635. Table 9 showed twenty OTS graduate students or 100% of all respondents answered question nine. The data reflected a mean of 4.15 for question nine. This indicates that the students agreed that TELETECHNET courses provided an overall better learning experience.

Table 9
Survey Question 9

Sample: 20 Respondents or 100% Percentage Response Rate

Question 9: Overall, do you feel that the instruction/teaching in the OTED 788, OTED 785, OTED 760, OTED 761, and OTED 635 courses facilitated a better learning experience for you?

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
7	9	4	0	1

Question #9	Mean	4.15

The tenth and final survey question was designed to measure the learning styles present in the OTS courses. The Learning Style Inventory for Adults was used according to the assessment completed in OTED 788. This assessment was used to determine what learning styles, if any, were accommodated in the TELETECHNET courses. Table 10 showed 19 OTS graduate students or 95% of all respondents answered question ten. The data showed that 57.9% of the students have a learning style of Sensing-Thinker (ST), 31.6% have a learning style of Intuitive-Thinker (NT), and 10.5% have a learning style of Sensing-Feeler (SF). The data reflected that the majority of students participating in the survey have a ST learning style.

Table 10
Survey Question 10

Survey: 19 Respondents or 95% Percent of Response Rate

Question #10: According to the learning Style Inventory for Adults completed in OTS course in the fall of 1998, my learning style is:

S-T	S-F	NT	NF
11	2	6	0

ST is Sensing-Thinkers SF is Sensing-Feelers

NT is Intuitive-Thinkers NF is Intuitive-Feelers

Table 11
Reports the students' responses to Survey Question 10 according to their learning styles

Question 9: Overall, do you feel that the instruction/teaching in the OTED 788, OTED 785, OTED 760, OTED 761, and OTED 635 courses facilitated a better learning experience for you?

	Strongly Agree	Agree	Uncertain
S-T	5	6	
S-F	1	1	
N-T		2	4

Summary

This chapter provided a detailed report of the OTS Graduate Program survey. Data were reported collectively for students completing any or all of OTS courses of OTED 788, OTED 785, OTED 760, OTED 761, and OTED 635. Chapter V will provide a detailed analysis of the information cited in Chapter IV. Additionally, conclusions and recommendations will also be presented in Chapter V.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Chapter V presents a summary of this study. It analyzes, synthesizes, and draws conclusions on the data presented and described in Chapter IV. Finally, recommendations for additional research are offered.

Summary

The problem of this study was to determine whether the four learning styles of Sensing-Feelers, Sensing-Thinkers, Intuitive-Thinkers, and Intuitive-Feelers were accommodated in Occupational and Technical Studies TELETECHNET graduate courses at Old Dominion University during the courses televised from the fall 1998 through the summer 1999.

The objectives of this study were to answer the following questions:

1. Whether the four learning styles outlined in the Learning Style Inventory for Adults can be accommodated in the non-traditional classroom with distance instructional delivery.
2. If all learning styles cannot be accommodated with distance instruction, which styles are more conductive to distance education?
3. If individual learning styles were accommodated, did accommodation of the individuals' learning styles facilitate a better learning experience for TELETECHNET graduate students?

This study was limited to TELETECHNET graduate students in the Occupational and Technical Studies graduate program at Old Dominion University. A qualitative study of the perceptions of the graduate students was conducted. The study was conducted

using a two-part questionnaire. Part I consisted of nine closed form questions and Part II was comprised of one open form question. Part I measured the accommodation of the students' learning styles and personal and academic success achieved in the Occupational and Technical Studies courses. Part II captured the learning styles of the students. Twenty students responded to the survey. After collecting all data, an analysis was performed. The conclusions and applicable recommendations based on this analysis were discussed in the chapter.

Conclusions

Based on the data collected during this study, the following conclusions are made:

1. **Whether the four learning styles outlined in the LSIA can be accommodated in the non-traditional classroom with distance instructional delivery.**

All of the questions on the survey were designed to measure whether the four learning styles of Sensing-Feeler (SF), Sensing-Thinker (ST), Intuitive-Thinker (NT), and Intuitive-Feeler (NF) were accommodated in the TELETECHNET classes. The first and second questions were designed to gather pertinent data about the graduate students' comprehension of learning style theory. Question one asks the graduate students to measure the level that learning style theory was successfully taught in the OTS courses. The students agreed that learning style theory was successfully taught in the OTS courses as reflected in a mean of 4.4, agree, for question one. Question two measured the students' personal understanding of learning style theory. The students reported that they have an understanding of learning style theory as reflected in a mean of 4.3, agree, for question two. This data gives considerable weight to the findings of this study because

the respondents' answers can be measured applicable to their knowledge of the subject of learning styles.

The third, fourth and fifth questions gathered pertinent data to measure the degree that the instruction in the OTS courses was successfully designed and delivered based upon learning style theory. The students expressed their knowledge of learning styles in their responses to questions three, four, and five. The data reflected a mean of 3.75, agree, for question three. The students reported that they agree that the instruction was varied according to learning style theory. The fourth question was also designed to measure the level that the instruction accommodated various learning styles. The responses reflected that students agreed that the information in the courses was easily comprehended and that they successfully transferred the knowledge to situations outside of the classroom. The data reflected a mean of 4.0, agree, for question four. Finally, the fifth question gathered data to measure the accommodation of learning styles with instructional components distinct to distance learning. The students again reported that they agreed that the distance instruction assisted with the comprehension of the course material. The data reflected a mean of 4.15, agree, for question five. This reflected that the students agreed that the distance instructional components such as e-mail, web based components, and class discussion pages present in the OTS courses had facilitated a better learning experience and successfully retained the students' interest.

The collective data for questions one through five supports that the instruction in the courses was based upon learning style theory. Question ten gathered data on the learning styles present in the OTS courses. 19 students, or 95%, responded to question ten. The data reflected that 11, or 57.9%, of the 19 students reported a learning style of

ST, two students, or 10.5%, reported a learning style of SF, and six students, or 31.6%, reported a learning style of NT. No students participating in the survey reported a learning style of NF. The data supports that the three learning styles of ST, SF, and NT were successfully accommodated in the TELETECHNET courses. The accommodation of the learning style of NF could not be determined based on the data collected for this study.

The remaining data was analyzed to address the second objective of the study.

2. If not all learning styles can be accommodate with distance instruction, which styles are more conductive to distance education?

Question one reflected a mean of 4.4, agree, question two reflected a mean of 4.3, agree, question three reflected a mean of 3.75, agree, question four reflected a mean of 4.0, agree, and question five reflected a mean of 4.15, agree. The collective data measuring accommodation of learning styles in the OTS courses in questions one through five supports that students agree that the learning styles of ST, SF, and NT were present in the population and accommodated according to the data collected from question ten. Question nine gathered data on whether the TELETECHNET courses provided an overall better learning experience for the students. The data reflected that five students, or 26.3%, with a ST learning style strongly agreed and six students, or 31.6%, with a ST learning style agreed that the overall learning experience was better. This supports that the learning style of ST was more conducive to distance educational instruction based upon learning style theory. One student, or 5.3%, with a SF learning style strongly agreed with question nine and one student, or 5.3%, with a SF learning style agreed. In addition, two students, or 10.5% with a NT learning style agreed with question nine.

However, four students, or 21%, were uncertain whether the distance classes based on learning style theory provided a better learning experience. Therefore, twice as many students with a NT learning style were uncertain than students that agreed with question nine. This data supports that the students with a NT learning style were more difficult to accommodate in the TELETECHNET courses.

3. **If individual learning styles were accommodated, did accommodation of the individuals' learning styles facilitate a better learning experience for TELETECHNET graduate students?**

The collective data supports that learning styles of ST, SF, and NT were accommodated. Questions six and seven gathered data to measure the academic success of the OTS TELETECHNET students as compared to students' academic success in the traditional classroom. These questions also measure the accommodation of learning styles in the distance classroom as compared to the traditional on-campus classroom. The students reported that they were uncertain whether they had experienced the same academic success in the TELETECHNET courses as achieved in traditional on-campus courses. The data reflected a mean of 3.65, agree, for question six. The students reported that they agreed that they had in fact experienced at least the same academic success. Question seven asked the students if they had experienced greater academic success in TELETECHNET. The data reflected a mean of 3.45, uncertain, for question seven. The data gathered to measure the success experienced by the graduate students in the distance courses that were based on learning style theory in comparison to the traditional on-campus courses supports that the OTS graduate students were not certain that they had achieved greater academic success.

However, question nine was the final question designed to gather data on the overall success of the instruction/teaching based on learning style theory in the OTS courses. The data reflected a mean of 4.14, agree. Thus, the majority of the respondents agreed that the instruction in the OTS courses facilitated an overall better learning experience. This data supports that learning styles were successfully accommodated in the OTS courses and that the students achieved a high level of learning in the classes.

The review of literature raised the question as to whether academic success achieved by non-traditional students could be attributed to the high motivation distance educated students experience. The data gathered with question eight measured whether the OTS students have access to educational opportunities other than distance educational opportunities. The OTS students agree that they would not have an opportunity to continue their education without the TELETECHNET courses. The data reflected a mean of 4.05, agree. The data supports that OTS students are highly motivated by the opportunity provided by Old Dominion's TELETECHNET program. However, the data gathered from questions seven does not support that this motivation has contributed to greater academic achievement in the OTS courses. A comparison of the students previous academic achievement and the academic success achieved in the OTS program is needed in order to draw a conclusive answer to this question.

However, question number nine measured the overall learning experience of the students. The data reflected that the students felt that they had experienced an overall better learning experience in the TELETECHNET courses. Therefore, the data supports that the overall learning experience was better than the traditional classroom

though the students did not report that they had achieved greater academic success in the courses.

Recommendations

Based on the findings and conclusions of this study, the researcher makes the following recommendations:

1. This study concluded that learning styles were accommodated in the Old Dominion University OTS graduate courses. However, due to the limitations of the study, the researcher could not conclusively determine if all learning styles could be accommodated as students with all learning styles did not respond to the survey, or may not have been represented in the study population. The completion of an additional study consisting of a larger population which allows greater assurance that all learning styles are represented in the population would be beneficial in supporting this objective.

2. The findings of the study support that instruction based upon learning style theory presented in the OTS courses provided an overall better learning experience for the students. However, the findings do not support that the students achieved greater academic success in the courses. This may successfully be addressed with the completion of an experimental study that addresses additional variables. These variables should include data on the students previous grades and whether the students had completed other graduate courses prior to the completion of distance education courses based upon learning style theory.

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APENDIX A

Sample of OTS Graduate Survey

Occupational and Technical Studies Graduate Student Survey

Part I

1. The educational theory of learning styles was taught in the OTED 788 and OTED 761 courses in the fall of 1998 and spring of 1999.

Strongly Agree ____ Agree____ Uncertain____ Disagree____ Strongly Disagree____

2. I have a good understanding of learning style theory.

Strongly Agree ____ Agree____ Uncertain____ Disagree____ Strongly Disagree____

3. The instruction/teaching in the OTED 788, OTED 785, OTED 760, OTED 761, and OTED 635, was varied according to learning style theory.

Strongly Agree ____ Agree____ Uncertain____ Disagree____ Strongly Disagree____

4. The instruction/teaching was delivered in a manner that made the information covered in the courses easy to understand and easy to apply to situations outside class.

Strongly Agree ____ Agree____ Uncertain____ Disagree____ Strongly Disagree____

5. The distance instructional components such as interactive satellite, e-mail, and web based components helped in the understanding of the materials covered in the courses and made the classes more interesting.

Strongly Agree ____ Agree____ Uncertain____ Disagree____ Strongly Disagree____

6. I experienced the same level of academic achievement in the Occupational and Technical Studies TELETECHNET courses as I have in traditional on-campus courses.

Strongly Agree ____ Agree____ Uncertain____ Disagree____ Strongly Disagree____

7. I experienced a greater level of academic achievement in the Occupational and Technical Studies courses than I have in traditional on-campus courses.

Strongly Agree ____ Agree____ Uncertain____ Disagree____ Strongly Disagree____

8. I would not have the opportunity to further my education without the opportunity provided by the Old Dominion TELETECHNET program.

Strongly Agree ____ Agree____ Uncertain____ Disagree____ Strongly Disagree____

9. Overall, do you feel that the instruction/teaching in the OTED 788. OTED 785, and OTED 760, OTED 761, and OTED 635 courses facilitated a better learning experience for you?

Strongly Agree ____ Agree____ Uncertain____ Disagree____ Strongly Disagree____

Part II

10. According to the Learning Style Inventory for Adults completed in the OTS course in fall of 1998, (or, at anytime) my learning style is:

(Sensing-Thinker)ST____ (Sensing-Feeler)SF____

(Intuitive-Thinker)NT____ (Intuitive-Feeler)NF____

APENDIX B

Cover Letter for OTS Survey

Dear Fellow Graduate Student:

As many of us complete the first full year of our graduate studies, I feel sure that you acknowledge the benefits of instruction that is based upon learning style theory. The available research and evidence support the accommodation of students' learning styles to help ensure a successful learning experience. Learning style theory will be extremely beneficial to each of us as we embark on new careers or assume greater roles in our current educational careers.

It is assured that each of us will be involved in some type of distance instruction in the near future. The topic of my graduate study is the evaluation of the feasibility and effectiveness of instruction based upon learning styles in distance education. My goal for the study is to provide evidence that supports whether learning style theory is effective in distance education. This information will be valuable to both educators in the private and public sectors. I hope you agree, and will feel compelled to compete the attached survey and **return to my by e-mail within 10 days**. The results of the study will be available to you to assist you in the design of your future instruction.

Sincerely

Deborah E. Hensley