A STUDY OF THE PERCEPTUAL LEARNING

OF ADULTS AGE 40 TO 60

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in partial fulfillment of the requirements
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DOCTOR OF EDUCATION
May, 1985

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Title of Study: A STUDY OF THE PERCEPTUAL LEARNING STYLE OF ADULTS AGE 40 TO 60

Pages in Study: 134 Candidate for Degree of Doctor of Education

Major Field: Occupational and Adult Education

Scope of Study: The objective of this study was to measure and compare the actual and perceived learning styles (print, aural, interactive, visual, haptic, kinesthetic, and olfactory) of prime-year adults aged 40 to 60. The revised Multi-Modal Paired Associates Learning Test (MMPALT II) and the Perceptual Modality Preference Survey (PMPS) were used in conducting the research. The subject population consisted of 10 females and 35 males. The research questions addressed in the study were: (1) Do the seven learning styles manifest themselves in prime-year adult learners? (2) Are there measurable differences in the learning styles of prime-year adults? (3) Are there identifiable patterns of dominant learning styles among prime-year adult learners? (4) Do prime-year adult learners' self-assessments of their perceptual modalities of learning style exhibit positive correlation with their actual learning styles as measured empirically. (5) Are there meaningful differences, by demographic characteristics, in the identifiable patterns of learning styles of prime-year adults? Learning styles of the 45 subjects were evaluated through an analysis of scores and ranks computed from the two measurement instruments. Pearson's correlation coefficient, analysis of variance, and t-tests were used in the data analysis to answer the five research questions.

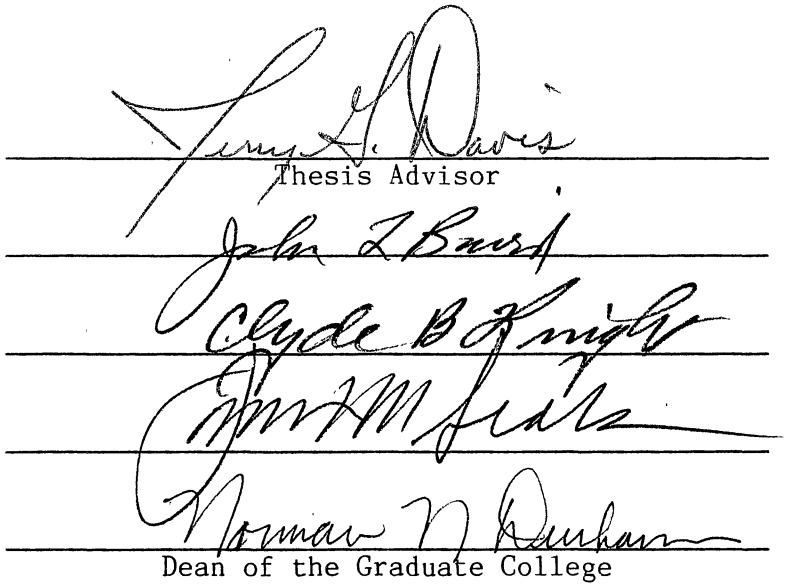
Findings and Conclusions: The analysis of the learning styles of the sample of prime-year adults indicated that prime-year adults do exhibit all seven learning styles. Differences in the degree of utilization of the seven learning styles were measured and were found to vary considerably among the subjects. Patterns of preferred or dominant learning styles were identified and ranked in order of dominance. It was found that the subjects' perceptions about their learning styles were not positively correlated with their actual or demonstrated learning styles. No meaningful differences were detected in the subjects' learning styles by a variety of demographic characteristics. The findings of the study led to several conclusions and recommendations about the use of the test instruments and avenues for future research.

ADVISER'S APPROVAL 

A STUDY OF THE PERCEPTUAL LEARNING STYLE

OF ADULTS AGE 40 TO 60

Thesis Approved:



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PREFACE

This study was accomplished under the guidance and direction of Dr. Waynne James, Associate Professor in the School of Occupational and Adult Education. Most of the study was conducted concurrently with six other graduate students--Jack Akins, Bill Brown, Joe Nix, Linda Rice, Bill Russell, and Evelyn Stewart--who are working on related studies of learning styles. Dr. Russell French, a professor at the University of Tennessee, assisted in training the graduate students in the use and administration of the measurement instruments. Dr. French and Dr. Clarence Cherry continued to work with the graduate students throughout their respective studies. Due to the close association among the graduate students and the related study topics, some portions of this study may appear similar to certain portions of the other students' work, particularly the discussions of research methodology and data collection.

ACKNOWLEDGMENTS

I wish to express my gratitude to the many people who were instrumental in the conduct and completion of this study. The contributions of two individuals are particularly appreciated. Dr. Waynne B. James, chairperson of my doctoral committee, provided the direction, advice, and guidance necessary for the successful completion of this study. My wife, Nina Lee Moore Lucas, provided strong, silent support throughout this endeavor and was my partner in testing the subjects who participated in the study.

Dr. Jerry Davis provided assistance and encouragement to me during the study and served as my dissertation advisor. He and the other members of my committee, Dr. John Baird, Dr. Cecil Dugger, and Dr. James Seals gave me many hours of counseling and assistance that contributed to the successful completion of this study. Dr. Clyde B. Knight kindly served as my committee chairman after Dr. James transferred to the University of South Florida. Dr. Melvin Miller, head of the School of Occupational and Adult Education at Oklahoma State University, was helpful throughout my doctoral program.

Mrs. Kay Porter was most helpful in facilitating the completion of this study. She typed the manuscript and provided invaluable assistance in handling administrative details.

Special thanks are due to Dr. Russell French and Dr. Clarence Cherry for granting me permission to use their learning style measurement instruments in this study. Dr. French instructed me in the use of

the instruments, and Dr. Cherry discussed the nature and application of the instruments with me in detail.

Finally, my appreciation and love are extended to my children, Rebecca L. Rollins, Kenneth A. Lucas, and Lorrena A. Lucas, for their patience and support during the many years of my doctoral program. My son-in-law, Dr. John B. Rollins, provided assistance during the initial testing period and timely encouragement during the data analysis. He was available for the occassional word of helpful criticism, and I appreciate his many hours of help, as well as his contribution in providing me with my granddaughter, Christy.

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INTRODUCTION

Adults are entering the education system in greater numbers than at any other time in history (Aslanian and Brickell, 1980). As a result, a major challenge to educators and administrators today is to help adult learners plan, conduct, and control their own learning experiences (Cherry, 1981).

Every adult enters into any undertaking with a unique background of experiences (Knowles, 1975). Methods of learning reported by adult learners include listening, observing, reading, practicing, and discussing. However, previous research has done relatively little to develop methods of measuring the ways in which adults actually learn, as opposed to ways in which adults say that they learn (Cross, 1982).

Cherry (1981) suggested that most efforts to identify and measure differences in individual learners have been in two fields, psychology and education. Efforts in these two fields have led to a concern for the learning style as a basic area of differences among learners.

Adult learners, rather than preferring passive, traditional approaches to learning, often dislike and avoid most traditional classroom instruction. Those learning methods that adults prefer and utilize should be identified and studied in order to determine how adults will learn best (Darkenwald and Merriam, 1982).

Gilley (1975), in a study of children's learning styles, found

that his subjects demonstrated a variety of learning styles. His conclusion was reached through an evaluation of six sensory modalities--print, aural, interactive, visual, haptic, and kinesthetic.

Cherry (1981) studied adult learning styles by using Gilley's (1975) Multi-Modal Paired Associates Learning Test (MMPALT), which included six perceptual learning styles--print, aural, interactive, visual, haptic, kinesthetic, and olfactory--and French's (1975) conceptualized seven perceptual learning styles, which added the olfactory element to the other six elements of the MMPALT. Cherry (1981) revised the olfactory element and called the instrument MMPALT II. He also developed a self-assessment instrument, the Perceptual Modality Preference Survey (PMPS), for use in conjunction with the MMPALT II (Cherry, 1981). Cherry concluded that adults' learning style patterns were similar in many ways to children's learning patterns as evaluated by Gilley. He recommended that learning styles be further studied using additional populations of learners.

Statement of the Problem

Continuing and adult education is concerned with all segments of the adult population, at all stages of understanding and learning. The average age of adult learners is 40 or more, with many students as old as 60 (Harris, 1980).

Farmer (1971) pointed out that the adult learner has multi-dimensional abilities that are not easily or accurately identified by a single measurement instrument. Further, many adult students feel ill-at-ease in an academic environment and, as a result, may be academically unsuccessful. She recommended that adult learners be tested with

regard to their individual learning styles, in order to enhance their learning experience.

Independent learning, tutorials, seminars, lectures, and practical work are some of the ways in which adult learning takes form. In many cases, adult learners exhibit individual preferences for specific learning methods over other methods (Lovell, 1980).

Clearly, then adult learners have unique educational needs that can be better met if educators can better understand adult learners' preferred learning styles. Learning styles of adults aged 40 to 60 need to be evaluated, in order to better understand their learning patterns and how their educational needs and goals can best be met.

Purpose of the Study

This study was based on Cherry's (1981) recommendation that his study of learning styles be extended to additional populations of learners. The purpose of the study was to evaluate the learning styles of prime-year adults, aged 40 to 60, using the Multi-Modal Paired Associates Learning Test--Cherry's (1981) MMPALT II--and the Perceptual Modality Preference Survey (PMPS). The population of prime-year adults was selected for this study of adult learning styles because this particular age group has not been previously evaluated in this context. The research questions addressed in this study were:

1. Do the seven learning styles manifest themselves in prime-year adult learners?

2. Are there measurable differences in the learning styles of prime-year adults?

3. Are there identifiable patterns of dominant learning styles

among prime-year adult learners?

4. Do prime-year adult learners' self-assessments of their perceptual modalities of learning style exhibit positive correlation with their actual learning styles as measured empirically?

5. Are there meaningful differences, by demographic characteristics, in the identifiable patterns of learning styles of prime-year adults?

Basic Assumptions

The following assumptions were made in this study:

1. The Multi-Modal Paired Associates Learning Test (MMPALT II) has been satisfactorily tested and validated.

2. The MMPALT II was a valid system for objectively measuring individual differences in the perceptual modality elements of learning style.

3. Construction of the Perceptual Modality Preference Survey (PMPS) was supervised by experts in the field of questionnaire development.

4. Responses to the PMPS reflected each subject's subjective opinion about his or her own perceptual modality learning style.

5. Adult learners voluntarily enter most educational programs and are motivated by self-defined goals.

6. Instructor awareness and students' self-awareness of students' learning styles influenced the teaching-learning process.

7. Since this study focused on measurements of individual learning styles of self-directed adults, the use of volunteer subjects did not distort the findings of the study.

Definitions of Terms

The following terms were used in this study:

Achievement - Achievement is broadly defined to include experience, degree of self-direction and self-discipline, and general level of maturity.

Adult - A person over 18 years of age.

Aural (A) - Gathering information primarily through listening.

Haptic (H) - Gathering information primarily through touching or holding.

Interactive (I) - Gathering information primarily through discussion and talking with others.

Kinesthetic (K) - Gathering information primarily through performance or engaging in bodily movements.

Learner - A person engaged in or expressing an interest in the acquisition of new skills or knowledge.

Learning Style - Individual method of relating to or interacting with the environment for the purpose of learning.

Olfactory (O) - Gathering information primarily through the sense of smell.

Perceptual Modality of Learning Style - The approach that an individual uses in gathering information and knowledge from his or her environment, using the five senses. In this study, the seven perceptual style elements identified by French (1975) and Gilley (1975) and researched by Cherry (1981) were the basis for investigating the learning styles of prime-year adults. The seven perceptual style elements are print, aural, interactive, visual, haptic, kinesthetic, and olfactory.

Perceptual Modality Preference Survey - A 42-item questionnaire, designed by Cherry (1981) to survey an individual's intuitive perception of his or her learning styles and to rank those styles in the perceived order of preference or dominance.

Prime-Year Adult - A person aged 40 to 60.

Print (P) - Gathering information primarily through the printed word.

Revised Multi-Modal Paired Associates Learning Test II (MMPALT II) - A seven-set paired associates learning test, as revised by Cherry (1981) designed to rank the perceptual modality of learning style elements in order of preference or dominance through objective, empirical measurement.

Visual (V) - Gathering information primarily through viewing pictures, images, objects, and activities.

Organization of the Study

Chapter I defines the purpose of the study. The research questions to be addressed are identified, the basic assumptions in the study are specified, and the terms used in the study are defined.

Chapter II describes the literature germane to the study. The historical background of the topic, previous studies of learning styles, and literature on the attributes of prime-year adult learners are discussed.

Chapter III describes the methodology of the study. The subjects are identified, the study instruments are discussed, and the data collection procedure is described.

Chapter IV presents the reuslts of the data analysis. The

demographic characteristics of the subjects are summarized, the analytical and statistical procedures used in the analysis are identified, and the findings of the data analysis are presented.

Chapter V summarizes the findings and conclusions of the study. Recommendations for application of the study findings in current adult educational practice and suggestions for avenues of further research are set forth.

CHAPTER II

REVIEW OF THE LITERATURE

Historical Background

In calling for more research on the nature and concerns of adult education, Knowles (1962) specified four areas that had been identified by the Adult Education Section of the Office of Education as being of growing importance in adult education. These four areas were:

1. To help Americans become more aware of the importance of life-long learning and of what it can do to solve many of their problems.

2. To assist in identifying national trends and problems that have implications for adult education.

3. To encourage adult educators and the public generally to accept adult education as an integral part of their regular educational programs.

4. To help bring about greater clarity of purpose and policies, more communication and cooperation among adult education groups, and better coordination among both public and private agencies in the use of resources.

Knowles asserted that efforts towards these objectives would lead to better research programs, education of the aged, and training of leaders and teachers for adults.

In this study of adult learning styles, Cherry (1981) found that much of the research that has been conducted in the area of individual

learning styles has been in the field of psychology. Cross (1982) reported on the extensive amount of research of adult learning styles, emphasizing that such studies have largely failed to identify learning styles used by adult learners. Knox (1977) pointed out that, as people grow older, they become increasingly different or individualized in their learning styles. Hence, identifying and evaluating learning styles is relatively important for adult learners.

James (1977) concluded that all competencies are not applicable to every individual; hence, the individuality of students should be stressed in the education field. Farmer (1971) suggested that the learning skills of adults have not yet been sufficiently quantified and that adult learners should be tested to determine their learning style patterns.

Individual Learning Styles

Educational needs and goals changed as individuals grow older (Knowles, 1975). Accordingly, adult educators have a responsibility to provide adult learners with appropriate opportunities for continuing education. Educators are becoming increasingly interested in doing so, as more adults are entering the educational environment. Adult students may be the primary target group for efforts to better tailor educational opportunities to meet their learning goals and requirements (Miller and Verduin, 1979).

Many educational institutions are involved in finding ways to identify and better meet the needs of adult students (Long and Heimstra, 1980). Continuing research efforts are needed to assist educators and adult learning program supervisors in developing adult educational

programs and curricula.

Tough (1979) suggested ways in which future research could best foster successful adult learning. He recommended counseling efforts to help individual students clarify their educational interests and problems, identify educational options and preferred learning directions, and define and perform the tasks necessary for successful completion of the learning effort. He emphasized the need for further study of adult education problems and solutions thereto.

Weinstock (1978) highlighted the trend towards continuing education on the part of adults:

> In a study completed in 1972, Dr. Charles R. Carlson of Bakersfield College surveyed a cross-section of 2,000 retired persons throughout California. The study found that 30 percent or more are excellent targets for college enrollment in terms of interest, mobility, and ability to participate without the colleges having to provide transportation or make special arrangements. Extrapolating this percentage on a national scale, there are 6.6 million elderly who are potential condidates for enrollment in higher education (p. 23).

Weinstock went on to indicate that teaching methods and educational procedures at some educational institutions may eventually have to expand or otherwise adapt to better serve adult learners:

> In 1974, in a final report to the California Commission on Aging, which had funded a demonstration project at Bakersfield, Dean Carlson wrote: 'This project has strongly indicated that a significant and well-planned program for the aging can bring in such large numbers of aging persons as to rival the enrollment of the total colleges. . . The needs and numbers involved could dramatically change the traditional philosophies and concepts held by virtually all educational institutions' (p. 23).

Harrington (1977) submitted that adult learners are at the center of some of today's most interesting innovations in higher education. Private foundations, individual donors, and the federal government are

funding projects to test new approaches to adult learning. A major problem in enhancing adult education programs is that the area of adult education has not yet achieved sufficient depth and breadth in its research base. This may be because adult education is regarded as a low-priority educational area by many educators and administrators, a situation that may be a primary obstacle to effectively meeting the educational requirements of adult learners (Harrington, 1977).

Uniqueness of Prime-Year Adult Learners

Lovell (1980) suggested that individuals differ considerably in their approaches to, performance with, and commitments to learning style. He pointed out that each individual is unique and that his learning will be most effective if his personal strengths and weaknesses in learning style are taken into account. Thus, to the extent that prime-year adults have unique learning styles, they would benefit from different instructional techniques than used for other groups of students. Adolescent and young adult student groups have long been the major focal point in the educational system, and more concern should be given to adult education (Harris, 1980).

All individuals have unique talents and interests, and the educational system should allow and encourage students to develop accordingly (Bowen, 1982). For educators to be able to facilitate such development, individual differences should be identified. Knowles (1973) stated that individual differences and cognitive styles are more pronounced in adults than in children and that, as a person ages, those differences become more pronounced. Hence, identification and measurement of individual learning styles is important for adult learners as well as

younger students.

Adult education is becoming recognized as an important part of the educational system (Lenz, 1980). Aslanian and Brickell (1980) concluded that, of 40 million American adults who were anticipating making a job or career change at the time of this study, many could benefit from additional education. Furthermore, according to Aslanian and Brickell, many adults are unaware of their own potential and could benefit from educational counseling if their learning styles could be meaningfully and accurately measured. However, as Scarbrough (1977) pointed out, past investigations into learning style preferences had been hampered by a lack of appropriate measurement instruments.

Development of a viable instrument for identifying and measuring learning styles was pursued by Gilley (1975) and by French (1975). In a study of children's learning styles, Gilley (1975) found that his subjects demonstrated a variety of learning styles. His conclusion was reached through an evaluation of six perceptual learning styles--print, aural, interactive, visual, haptic, and kinesthetic. French (1975) added the olfactory element to the other six elements of learning styles and called the instrument the Multi-Modal Paired Associates Learning Test (MMPALT).

Cherry (1981) revised the olfactory element of the MMPALT and dubbed the revised instrument the MMPALT II. He also developed a self-assessment instrument, the Perceptual Modality Preference Survey (PMPS) for use in conjunction with the MMPALT II (Cherry, 1981). Cherry concluded that adults' learning style patterns were similar in many ways to children's learning patterns as evaluated by Gilley. He

recommended that learning styles be further studied using additional populations of learners.

CHAPTER III

METHODOLOGY

This study utilized the Perceptual Modality Preference Study (PMPS) and the Multi-Modal Paired Associates Learning Test (MMPALT II) to evaluate the learning styles of prime-year adult learners. Permission to use the MMPALT II instrument is documented in Appendix A. This chapter describes the subjects tested in the study and discusses the two instruments and the administration thereof.

Description of Subjects

Adult learning styles were evaluated on the basis of responses from 45 individuals aged 40 to 60. The subjects included air traffic control specialists, military installation instructors/counselors, and vocational-technical personnel. Twenty-three of the subjects resided in Oklahoma City, Oklahoma, and 22 of the subjects lived in Fort Myers, Florida. All of the subjects voluntarily participated in the study, and all were involved in education either as a teacher, instructor, or counselor or as a student. Demographic characteristics of the subjects are detailed in Chapter IV.

Evaluation Instruments

The Perceptual Modality Preference Survey (PMPS) allows an individual to express his perceptions about his learning style. In this

study, the PMPS was administered in the same form as used by Cherry (1981) in his study. The PMPS elicits one of four possible responses to each of 42 questions. The possible responses to each question are "always", "usually", "seldom", and "never". A copy of the PMPS is shown in Appendix D.

The Multi-Modal Paired Associates Learning Test II (MMPALT II) was also administered in the same form as used by Cherry (1981). The original instrument was developed by Gilley (1975) and consisted of six perceptual modality elements--print, aural, interactive, visual, haptic, and kinesthetic. Cherry refined the original instrument and added the olfactory element. Guide sheets for evaluators to adminster the MMPALT II are shown in Appendix C, and response sheets for the MMPALT II are shown in Appendix E.

The print measurement of the MMPALT II consisted of each subject viewing pairs of printed trigrams (nonsense words) and common nouns, projected on a screen, and then attempting to recall the common nouns when viewing the associated trigrams. A slide was prepared for each pair of common nouns and trigrams. The use of projected slides assured consistency of color and light for viewing by the subjects. Standard type was used in preparing the slides, with black letters on white background, to simulate the appearance of words in books or other printed materials. Following the initial viewing of the noun and trigram pairs, the subject was shown the trigrams in a predetermined, randomly resorted order was and asked to recall the noun associated with each trigram.

Aural measurement consisted of each subject listening to spoken trigram and common noun pairs. The word pairs were recorded on

cassette tape by a professional broadcaster, in order to minimize any influence of pronounciation or dialect on the test results. After listening to the trigram/noun pairs, the subject attempted to recall the noun associated with each trigram when the trigrams were presented again in a predetermined, randomly different order.

Interactive measurement consisted of each subject being presented pairs of trigrams and nouns, verbally, by the test evaluator. Following the initial presentation, the subject was asked to recall the common noun associated with each trigram when the evaluator verbally presented the trigrams in a predetermined, randomly different order.

Visual measurement consisted of each subject viewing pairs of abstract symbols and common object pictures, projected onto a screen. The subject then attempted to recall the common object associated with each symbol when the symbols were viewed again in a predetermined, randomly resorted order.

Haptic measurement consisted of each subject, while blindfolded, holding and handling pairs of common objects. The subject then attempted to recall the response object associated with each stimulus object when presented with each of the stimulus objects in a predetermined, randomly different order.

Kinesthetic measurement consisted of each subject, while blindfolded, being guided and directed by the evaluator through pairs of body movements. The subject then attempted to recall the response movement, either by description or performance of the movement, when directed through each of the stimulus movements in a predetermined, randomly different order.

Olfactory measurement consisted of each subject, while blindfolded,

being presented with pairs of aromas. The aroma samples were produced by placing small amounts of chemicals on cotton balls in identical containers. The evaluator administering the test identified the containers by randomly assigned colored labels. Following the initial presentation of aromas, the subject attempted to name the associated response aroma when presented with each of the stimulus aromas in a randomly different order. Sources of the extracts and oils used for the olfactory test are shown in Appendix B.

Testing Procedures

Evaluators were trained in the administration of the PMPS and MMPALT II instruments at a two-day seminar conducted in Oklahoma City, Oklahoma in November, 1982. The trainees were instructed on how to administer each element of the instruments and then took the two tests themselves. Following the seminar, four individuals were trained to administer the tests and assisted in testing the 45 subjects who participated in this study.

The PMPS was administered to each subject by asking him or her to complete the questionnaire in privacy. Each subject was advised that neither the PMPS nor the MMPALT II contained any deliberately misleading or "trick" questions. All 45 subjects completed the PMPS without incident.

The seven elements of the MMPALT II were administered to each subject by an evaluator. All 45 subjects completed the MMPALT II without incident.

For the print test, each subject was placed before a projection screen and viewed each of the 10 pairs of trigrams and common nouns

for a duration of seven seconds. The trigrams were then shown to the subject again, in a different order, and the subject was given 10 seconds to recall the common noun associated with each trigram and write the noun on the answer sheet provided.

For the aural test, each subject was placed beside a cassette tape recorder and listened to 10 pairs of trigrams and common words. The subject then listened to the trigrams again, in a different order, and was allowed 10 seconds to recall the noun associated with each trigram and write the noun on the answer sheet provided.

For the interactive test, the evaluator presented 10 pairs of trigrams and common nouns to each subject, while at the same time attempting to put the subject at ease through verbal interaction with the subject, in a different order, and the subject was given 10 seconds to record the associated noun on the answer sheet provided.

For the visual test, each subject viewed 10 pairs of abstract symbols and common object pictures on a projection screen. When the abstract symbols were presented in a different order, the subject had 10 seconds in which to record the name of the common object associated with each symbol, on the answer sheet provided.

For the haptic test, each subject was blindfolded and presented with each of 10 pairs of common objects. The subject was allowed to handle each pair of objects for seven seconds. The stimulus objects were then presented to the subject in a different order, and the subject was allowed 10 seconds to identify the response object associated with each stimulus object. The subject's responses were recorded by the evaluator.

For the kinesthetic test, each subject was blindfolded and guided

by the evaluator through 10 pairs of body movements. The subject was then guided through each stimulus movement again, in a different order, and was allowed 10 seconds in which to identify or demonstrate the associated response movement. The subject's responses were recorded by the evaluator.

For the olfactory test, each subject was blindfolded and allowed to sniff each of 10 pairs of aromas for a duration of seven seconds. Following the initial presentation of aromas, the stimulus aromas were presented in a different order, and the subject was given 10 seconds to identify the response aroma associated with each of the stimulus aromas. The subject's responses were recorded by the evaluator.

Data Collection

Due to the length of time (almost two years) during which the data for this study were collected and compiled, extreme care was exercised in the control of all material associated with the data collection. Subjects were closely monitored to ensure that all answer sheets were properly completed. The ranks and scores for the PMPS and MMPALT II instruments are shown in Appendix F for each of the 45 subjects.

CHAPTER IV

ANALYSIS OF DATA

To address the five research questions of interest in this study, an analysis of the learning styles of 45 subjects was performed. The two measurement instruments, PMPS and MMPALT II, were administered to each subject in order to evaluate learning styles. The instruments measured the subjects' perceptions and performance with respect to seven learning styles that were distinguishable in the tests. The data analysis consisted of correlating PMPS and MMPALT II scores and ranks, for individual subjects as well as all subjects combined, and performing analysis of variance and t-tests of PMPS and MMPALT II scores by various demographic characteristics.

The findings of the data analysis are presented in this chapter. The first section of this chapter describes demographic characteristics of the subjects. The second section evaluates the subjects' perceived learning style preferences, as measured by the PMPS. The third section evaluates the subjects' actual learning style preferences, as measured by the MMPALT II. The fourth section compares the subjects' actual and perceived preferences. The fifth section presents correlations of PMPS and MMPALT II ranks and scores. The sixth section evaluates learning styles, as measured by PMPS and MMPALT II scores, by demographic characteristics of the subjects. The seventh section addresses the five research questions in light of the results of the data analysis.

The last section summarizes the findings and implications of the data analysis.

Description of Subjects

Forty-five prime-year adults, aged 40 to 60, participated in this study. The demographic characteristics of the subjects, along with an indication of the order in which the PMPS and MMPALT II tests were administered, are summarized in Table I. The subjects were air traffic control specialists, military installation instructors/counselors, and vocational-technical personnel. Twenty-two of the subjects resided in Florida and 23 in Oklahoma. The data sample included 35 males and 10 females. Thirty-seven of the subjects were married, and eight were single. Education levels of the subjects ranged from some high school to the doctoral degree, with the modal level being some college and with 14 of the subjects having a college degree. Annual income of the subjects ranged from below $20,000 to above $50,000, with the modal income being $30,000 to $40,000. Twelve of the subjects had some form of handicap, primarily visual. Nineteen of the subjects smoked, and 25 were nonsmokers. Six subjects were left-handed, and 17 were involved in some type of continuing education program. Sixteen subjects were born in rural areas, 17 in urban areas, and 12 in suburban areas. Nineteen were reared in rural areas, 13 in urban areas, and 13 in suburban areas.

Perceived Learning Styles as Measured by PMPS

The self-assessed perceived learning styles of the prime-year adults in the sample were evaluated using the PMPS. The rank orders of

TABLE I

DEMOGRAPHIC CHARACTERISTICS OF 45 ADULTS AGED 40 TO 60

Characteristic	Number	Percentage
Age		
40-45	12	27
46-50	18	40
51-55	9	20
56-60	6	13
Sex		
Male	35	78
Female	10	22
Marital Status		
Married	37	82
Single	8	18
Education		
Some High School	5	11
High School Diploma	11	25
Some College	15	33
Bachelor's degree	8	18
Master's degree	4	9
Doctor's degree	2	4
Annual Income		
Less than $20,000	7	16
$20,000 - $25,000	6	13
$25,000 - $30,000	4	9
$30,000 - $40,000	12	26
$40,000 - $50,000	9	20
More than $50,000	7	16
State of Residence		
Florida	22	49
Oklahoma	23	51
Handicap Status		
Hearing	1	2
Physical	3	7
Visual	8	18
None	33	73
Smoke		
Yes	19	42
No	26	58

TABLE I (Continued)

Characteristic	Number	Percentage
Handedness		
Right	39	87
Left	6	13
Area Born		
Rural	16	35
Suburban	12	27
Urban	17	38
Area Reared		
Rural	19	42
Suburban	13	29
Urban	13	29
Continuing Education		
Yes	17	38
No	28	62
Order of Testing		
MMPALT II first	22	49
PMPS first	23	51

each of the seven styles are summarized in Table II. On the basis of the frequencies at which the subjects ranked the seven styles in order of preference (with one being the most preferred and seven the least preferred), the kinesthetic style was perceived to be the most preferred learning style, with 19 rank one responses, and the olfactory style was perceived to be the least preferred, with 38 rank seven responses. An examination of the numbers of responses between one and four and between 4.5 and seven for the seven styles indicates that their rank order of preference was as follows, from most preferred to least preferred:

1. Kinesthetic - 36 responses between rankings one and four, and nine responses between rankings 4.5 and seven.

2. Interactive - 35 responses between rankings one and four, and 10 responses between rankings 4.5 and seven.

3. Visual - 31 responses between rankings one and four, and 14 responses between rankings 4.5 and seven.

4. Aural - 26 responses between rankings one and four, and 19 responses between rankings 4.5 and seven.

5. Haptic - 24 responses between rankings one and four, and 21 responses between rankings 4.5 and seven.

6. Print - 22 responses between rankings one and four, and 23 responses between rankings 4.5 and seven.

7. Olfactory - three responses between rankings one and four, and 42 responses between rankings 4.5 and seven.

Although the response ranges of one to four and 4.5 to seven were arbitrarily chosen, ranges of one to 3.5 and four to seven and of one to 3.5 and 4.5 to seven did not appreciably affect the ordering. The only effect of using the two different ranges to categorize the

TABLE II

SUMMARY OF RANK ORDER OF PERCEIVED LEARNING STYLES OF PRIME-YEAR ADULTS, AS MEASURED BY THE PMPS

Rank Order	Frequency of Response by Learning Style						
	Print	Aural	Interactive	Visual	Haptic	Kinesthetic	Olfactory
1	5	6	6	6	4	19	0
1.5	1	0	1	2	1	1	0
2	6	3	10	5	8	6	0
2.5	0	1	2	1	0	2	1
3	4	8	9	10	6	1	1
3.5	0	3	2	0	1	3	0
4	6	6	6	8	4	4	1
4.5	1	2	2	0	0	1	1
5	9	9	3	7	7	2	1
5.5	1	3	2	0	0	0	0
6	11	4	3	4	11	6	2
6.5	0	0	0	1	0	0	0
7	1	1	0	2	3	0	38
Subtotal 1-4	22	26	35	31	21	36	3
Subtotal 4.5-7	23	19	10	14	24	9	42
Total	45	45	45	45	45	45	45

response frequencies was that the aural and haptic styles were tied for rank four.

An evaluation of PMPS scores, summarized in Table III, leads to a similar conclusion about the subjects' perceived preferences of learning styles. The mean scores indicated the following order of perceived preferences of the seven styles, from most preferred to least preferred:

1. Kinesthetic - mean score of 9.93.
2. Interactive - mean score of 4.29.
3. Visual - mean score of 3.58.
4. Aural - mean score of 1.51.
5. Print - mean score of 0.62.
6. Haptic - mean score of 0.49.
7. Olfactory - mean score of -19.40.

The only difference in perceived learning style preferences between the order by rank and the order by score was in the relative order of the print and haptic styles. However, these two styles were very close in both rank order (24 responses between ranks one and four for haptic, and 22 for print) and mean score (0.62 for print and 0.49 for haptic).

Actual Learning Styles as Measured by MMPALT II

The actual learning styles of prime-year adults in the sample were evaluated using the MMPALT II. Table IV summarizes the rank orders of each of the seven styles. In contrast to the PMPS results in which the kinesthetic style was perceived to be the preferred learning style, based on frequencies of rankings of the seven styles, the MMPALT II results indicated that the visual learning style was dominant, with 22

TABLE III

SUMMARY OF PMPS SCORES FOR
ADULTS AGED 40 TO 60

Score Category	Frequency of Response by Learning Style						
	Print	Aural	Interactive	Visual	Haptic	Kinesthetic	Olfactory
-36 / -29	0	0	0	1	1	0	10
-28 / -21	2	0	1	0	1	1	18
-20 / -13	4	1	0	1	3	3	8
-12 / -5	10	11	5	6	13	1	4
-4 / 4	12	20	22	19	12	6	3
5 / 12	8	9	7	11	7	13	1
21 / 28	2	0	0	0	2	5	0
29 / 36	0	1	1	1	0	2	1
Mean	0.62	1.51	4.29	3.58	0.49	9.93	-19.40
Minimum	-27	-13	-25	-30	-29	-21	-36
Maximum	23	29	31	36	24	30	32

TABLE IV

SUMMARY OF RANK ORDER OF OBSERVED LEARNING STYLES OF PRIME-YEAR ADULTS, AS MEASURED BY THE MMPALT II

Rank Order	Frequency of Response by Learning Style						
	Print	Aural	Interactive	Visual	Haptic	Kinesthetic	Olfactory
1	0	1	7	22	2	2	0
1.5	1	2	1	2	4	0	0
2	1	8	10	10	6	1	0
2.5	2	3	5	2	4	2	0
3	5	4	1	2	2	7	0
3.5	2	0	3	2	6	2	0
4	3	4	3	2	4	9	2
4.5	5	5	5	1	7	2	1
5	10	5	3	1	4	4	6
5.5	4	5	3	0	2	5	3
6	3	3	2	0	2	6	2
6.5	4	4	0	0	1	3	10
7	5	1	2	1	1	1	21
Subtotal							
1-4	14	22	30	42	28	24	3
Subtotal							
4.5-7	31	23	15	3	17	21	43
Total	45	45	45	45	45	45	45

rank one responses. As in the PMPS results, the olfactory style was the least preferred style in the MMPALT II rank order, with 21 rank seven responses. The numbers of rank responses between one and four and between 4.5 and seven indicate the following rank order of preference of the seven styles, from most preferred to least preferred:

1. Visual - 42 responses between rankings one and four, and three responses between rankings 4.5 and seven.

2. Interactive - 30 responses between rankings one and four, and 15 responses between rankings 4.5 and seven.

3. Haptic - 28 responses between rankings one and four, and 17 responses between rankings 4.5 and seven.

4. Kinesthetic - 24 responses between rankings one and four, and 21 responses between rankings 4.5 and seven.

5. Aural - 22 responses between rankings one and four, and 23 responses between rankings 4.5 and seven.

6. Print - 14 responses between rankings one and four, and 31 responses between rankings 4.5 and seven.

7. Olfactory - two responses between rankings one and four, and 43 responses between rankings 4.5 and seven.

As with the PMPS ranking of the seven styles, the response ranges of one to four and 4.5 to seven were arbitrarily chosen. Ranges of one to 3.5 and four to seven and of one to 3.5 and seven resulted in a reversal of the relative positions of the kinesthetic and aural styles in the MMPALT II rank order.

The MMPALT II scores, summarized in Table V, indicated a similar ordering of the seven learning styles, as compared with the MMPALT II ranks. As with the MMPALT II ranks, the visual style was most preferred,

TABLE V

SUMMARY OF MMPALT II SCORES
FOR ADULTS AGED 40 TO 60

	Frequency of Response by Learning Style						
Score	Print	Aural	Interactive	Visual	Haptic	Kinesthetic	Olfactory
0	4	3	2	1	2	2	14
1	10	5	5	0	2	7	16
2	10	6	4	5	6	6	8
3	4	5	6	1	12	13	3
4	8	10	5	4	6	9	3
5	4	7	4	7	5	3	0
6	4	3	9	6	6	3	10
7	1	6	4	8	4	2	-
8	0	0	3	5	1	0	0
9	0	0	2	5	1	0	0
10	0	0	1	3	0	0	1
Mean	2.78	3.71	4.56	6.02	4.00	3.13	1.40
Minimum	0	0	0	0	0	0	0
Maximum	7	7	10	10	9	7	10

and the olfactory style was least preferred. The mean scores indicated the following order of learning style preferences:

1. Visual - mean score of 6.02.
2. Interactive - mean score of 4.56.
3. Haptic - mean score of 4.00.
4. Aural - mean score of 3.71.
5. Kinesthetic - mean score of 3.13.
6. Print - mean score of 2.78.
7. Olfactory - mean score of 1.40.

The only difference in actual learning style preferences between the rank order and score order was in the relative order of the kinesthetic and aural styles. However, these two styles were similar in both rank order (23 responses between ranks one and four for aural, and 21 for kinesthetic) and mean score (3.71 for aural and 3.13 for kinesthetic).

Comparison of Actual and Perceived Learning Style Preferences

The analysis of perceived and actual learning style preferences, summarized in Table II through V, indicated that there was a distinct difference between the subjects' perceptions about their preferred or dominant learning styles, as measured by the PMPS, and their observed performance on the MMPALT II tests of learning styles. The style perceived to be dominant--the kinesthetic style--was actually one of the lesser preferred styles in the MMPALT II tests of learning performance. The visual style, perceived to be the third most preferred style, was the dominant style in the MMPALT II tests. The

haptic style, perceived to be a lesser preferred style, was found to be the third most preferred. The interactive, aural, print, and olfactory styles were found in the MMPALT II tests to be of the same, or approximately the same, relative importance as perceived by the subjects in the PMPS tests. The ordering of the seven learning styles by PMPS and MMPALT II ranks and scores are shown in Table VI. Histograms of the PMPS and MMPALT II total scores for the seven styles are shown in Figure 1, to further illustrate the learning style order.

Correlations of PMPS and MMPALT II Ranks and Scores

The degree of correlation between subjects' perceptions about their learning styles and their actual learning styles was evaluated by correlating PMPS and MMPALT II scores for individual subjects and correlating PMPS and MMPALT II ranks and scores for all subjects combined. Correlations were made by calculating Pearson's product moment correlation coefficient (Steel and Torrie , 1960). The correlation coefficient, r, was calculated as:

$$r = \frac{(X_i - \bar{X})\ (Y_i - \bar{y})}{(X_i - \bar{X})^2 \quad (Y_i - \bar{y})^2}$$

Individual correlations were made for the seven pairs of PMPS and MMPALT II scores for the seven learning styles. The correlation coefficients for each of the 45 subjects are shown in Table VII. In accordance with Best (1959), the correlation coefficients were categorized as follows:

TABLE VI

RELATIVE ORDERING OF LEARNING STYLES BY
PMPS AND MMPALT II RANKS AND SCORES

PMPS		MMPALT II	
Rank	Score	Rank	Score
K	K	V	V
I	I	I	I
V	V	H	H
A	A	K	A
H	P	A	K
P	H	P	P
O	O	O	O

P = Print
A = Aural
I = Interactive
V = Visual
H = Haptic
K = Kinesthetic
O = Olfactory

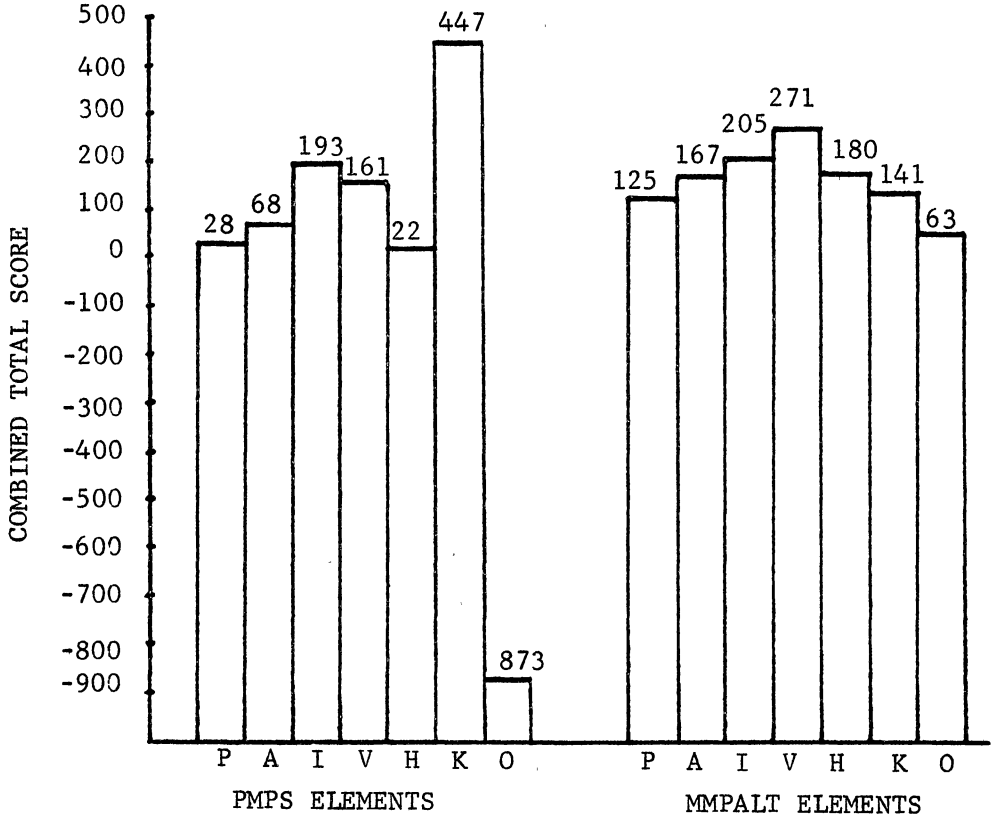

Figure 1. Total Scores for Subject Population

TABLE VII

CORRELATIONS OF MMPALT II AND PMPS SCORES
FOR INDIVIDUAL SUBJECTS

Subject Number	Correlation Coefficient
1	0.60
2	0.08
3	-0.24
4	0.41
5	-0.13
6	0.63
7	0.04
8	0.69
9	0.47
10	0.01
11	0.71
12	0.59
13	0.37
14	0.06
15	0.74
16	0.19
17	0.69
18	0.33
19	0.76
20	0.29
21	0.38
22	0.01
23	0.42
24	0.23
25	0.80
26	0.61
27	0.33
28	0.20
29	0.21
30	0.12
31	0.20
32	0.09
33	0.43
34	0.07
35	0.55
36	0.61
37	-0.05
38	0.45
39	0.36
40	-0.21
41	0.24
42	0.34
43	0.33
44	-0.77
45	0.44

Coefficient (Absolute Value)	Relationship	Number
0.00 to 0.20	Negligible	13
0.21 to 0.40	Low or slight	14
0.41 to 0.60	Moderate	8
0.61 to 0.80	Substantial or marked	10
0.81 to 1.00	High to very high	0

None of the subjects demonstrated a high to very high correlation between his or her PMPS and MMPALT II scores. Ten (22 percent) of the subjects demonstrated substantial or marked correlation, while eight (18 percent) demonstrated substantial or marked correlation between scores. Fourteen (31 percent) demonstrated low or slight correlation, and 13 (29 percent) demonstrated negligible correlation. In summary, a meaningful correlation between individual PMPS and MMPALT II scores was found for fewer than half (40 percent) of the subjects.

Correlations were also calculated for PMPS and MMPALT II ranks and scores, for all subjects combined. These correlations were made separately for each learning style, so that correlation coefficients could be calculated for the ranks as well as the scores. For the ranks, Pearson's correlation coefficient was used to calculate the degree of correlation between the PMPS and MMPALT II ranks assigned to each particular style by each of the 45 subjects.

Table VIII presents the correlation coefficient for PMPS and MMPALT II ranks for the seven learning styles, individually. In accordance, with Best (1959), each of the coefficients indicates either negligible or low correlation between PMPS and MMPALT II ranks. Furthermore, the probability associated with a test of the null hypothesis that a correlation coefficient is equal to zero is given in parentheses below each coefficient in Table VIII; as shown, none of the coefficients is

TABLE VIII

CORRELATIONS OF MMPALT II AND PMPS RANKS OF LEARNING STYLES OF PRIME-YEAR ADULTS

PMPS	MMPALT II						
	Print	Aural	Interactive	Visual	Haptic	Kinesthetic	Olfactory
Print	0.12 (negligible) (0.44)						
Aural		-0.11 (negligible) (0.49)					
Interactive			0.28 (low) (0.06)				
Visual				0.11 (negligible) (0.46)			
Haptic					0.13 (negligible) (0.40)		
Kinesthetic						0.01(negligible) (0.94)	
Olfactory							0.09 (negligible) (0.57)

Note: For a test of the null hypothesis that a correlation coefficient is equal to zero, the significance probability is shown in parentheses below each correlation coefficient.

significantly different from zero at the 0.05 level.

The correlation coefficient for the PMPS and MMPALT II scores for each learning style is given in Table IX, for the seven learning styles. As for the ranks in Table VIII, each coefficient indicated either negligible or low correlation between the PMPS and MMPALT II scores for each learning style. Although the coefficients for the interactive and visual styles were significantly different from zero, the correlation between the scores was low.

In summary, the coefficients of correlation between PMPS and MMPALT II scores and ranks indicated that there was no meaningful correlation between the two measures of learning style preferences. Although 40 percent of the individual subjects demonstrated moderate or substantial correlations between scores, there was no collective evidence of a discernable correlation between PMPS and MMPALT II ranks or scores.

Comparison of Learning Styles by Groups

The PMPS and MMPALT II scores were evaluated for differences in learning styles by demographic characteristics and by the sequence in which the PMPS and MMPALT II instruments were administered, to determine whether learning styles vary by demographic groups and whether PMPS and MMPALT II scores are affected by the order in which the two tests are administered to subjects. For those characteristics with two levels or groups, the t-test for difference in means was used. For those groups with more than two levels or groups, one-way analysis of variance was performed. Significance tests for both the t-test and the analysis of variance were made at the 0.05 probability level (Steel and Torrie, 1960).

TABLE IX

CORRELATION OF MMPALT II AND PMPS SCORES FOR LEARNING STYLES OF PRIME-YEAR ADULTS

PMPS	MMPALT II						
	Print	Aural	Interactive	Visual	Haptic	Kinesthetic	Olfactory
Print	0.04 (negligible) (0.78)						
Aural		-0.15 (negligible) (0.33)					
Interactive			0.37 (low) (0.01)				
Visual				0.39 (low) (0.01)			
Haptic					-0.06 (negligible) (0.68)		
Kinesthetic						-0.07 (negligible) (0.67)	
Olfactory							0.01 (negligible) (0.98)

Note: For a test of the null hypothesis that a correlation coefficient is equal to zero, the significance probability is shown in parentheses below each correlation coefficient.

Age Groups

The 45 subjects were categorized into four groups by age, as follows:

Age	Number	Percent
40 to 45	12	27
46 to 50	18	40
51 to 55	9	20
56 to 60	6	13

An analysis of variance was performed, in which each PMPS score and each MMPALT II score was related to the age classification variable. Table X presents the results for the PMPS scores for each learning style, and Table XI shows the results for the MMPALT II scores. PMPS scores for the kinesthetic style varied significantly by age group, but the MMPALT II scores for this style were not found to vary significantly by age group. The MMPALT II score for the visual style, however, did vary significantly by age group.

Table XII gives the mean scores and numbers of subjects for the four age groups for the two scores that varied by age group. The older subjects perceived themselves as favoring both the haptic and kinesthetic styles, relative to the younger subjects, but the MMPALT II scores did not support this perceived differences (Table X). However, the younger subjects did significantly favor the print style, relative to the older subjects, with mean scores of 3.25 and 3.39 for the 40 to 45 and 46 to 50 groups, respectively, compared with a mean score of 1.67 for each of the two older groups. This implied that the younger subjects better utilized the print learning style than did the older subjects, although the print style was less preferred than most of the other styles by all subjects combined (Table VI).

TABLE X

RESULTS OF ANALYSIS OF VARIANCE OF PMPS SCORES FOR AGE GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	3	702.49	234.16	1.64
	Within groups	41	5,868.08	143.12	
	Total	41	6,570.58		
Aural	Among groups	3	303.74	101.25	1.30
	Within groups	41	3,197.50	77.99	
	Total	44	3,501.24		
Interactive	Among groups	3	444.08	148.03	1.71
	Within groups	41	3,553.17	86.66	
	Total	44	3,997,24		
Visual	Among groups	3	155.92	51.97	0.44
	Within groups	41	4,809.06	117.29	
	Total	44	6,285.24		
Haptic	Among groups	3	1,065.30	355.10	2.79*
	Within groups	41	5,219.94	127.32	
	Total	44	6,285.24		
Kinesthetic	Among groups	3	1,225.61	408.54	3.03*
	Within groups	41	5,519.19	134.61	
	Total	44	6,744.80		
Olfactory	Among groups	3	931.88	310.63	2.01
	Within groups	41	6,342.92	154.71	
	Total	44	7,274.80		

*Significant at 0.05 level
Critical F value = 2.84

TABLE XI

RESULTS OF ANALYSIS OF VARIANCE OF MMPALT II SCORES FOR AGE GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	3	27.92	9.31	2.89*
	Within groups	41	131.86	3.22	
	Total	44	159.78		
Aural	Among groups	3	31.16	10.39	2.66
	Within groups	41	160.08	3.90	
	Total	44	191.24		
Interactive	Among groups	3	7.81	2.60	0.37
	Within groups	41	287.31	7.01	
	Total	44	295.11		
Visual	Among groups	3	24.56	8.19	1.37
	Within groups	41	244.42	5.96	
	Total	44	268.98		
Haptic	Among groups	3	6.33	2.11	0.47
	Within groups	41	185.67	4.53	
	Total	44	192.00		
Kinesthetic	Among groups	3	9.70	3.23	1.09
	Within groups	41	121.50	2.96	
	Total	44	131.20		
Olfactory	Among groups	3	15.24	5.08	1.74
	Within groups	41	119.56	2.92	
	Total	44	134.80		

*Significant at 0.05 level
Critical F value = 2.84

TABLE XII

PMPS AND MMPALT II SCORES FOR PRINT, HAPTIC, AND KINESTHETIC STYLES BY AGE GROUPS

Style and Score	Age Group			
	40 - 45	46 - 50	51 - 55	56 - 60
Kinesthetic PMPS				
N	12	18	9	6
Mean Score	2.25	11.28	11.67	18.67
Minimum Score	-21	-17	-14	9
Maximum Score	18	30	28	29
Print, MMPALT II				
N	12	18	9	6
Mean Score	3.25	3.39	1.67	1.67
Minimum Score	0	1	0	1
Maximum Score	6	7	5	2

Sex Groups

The subjects were categorized into two groups by sex, as follows:

Sex	Number	Percent
Female	10	22
Male	35	78

A t-test was performed to determine whether the PMPS or MMPALT II scores varied between the two groups. As seen in Tables XIII and XIV, the only score that differed significantly between males and females was the MMPALT II score for the haptic style, with a mean score of 5.30 for females and 3.63 for males. This implied that the female subjects could use the haptic style more effectively than could the male subjects. However, the small number of women in the sample (10) allows the possibility that the difference in scores by sex groups could have been due to chance, rather than to women's relative advantage in utilizing the haptic learning style.

Marital Status Groups

The subjects were categorized into two groups by marital status as follows:

Marital Status	Number	Percent
Married	37	82
Single	8	18

A t-test for differences in scores by marital status was performed, with the PMPS score being significantly higher for married subjects than for single subjects, as shown in Table XV. However, this perceived difference in the use of the haptic style was not supported by the MMPALT II results, as seen in Table XVI.

TABLE XIII

RESULTS OF T TEST OF PMPS SCORES
FOR SEX GROUPS

Style	N	Mean	Standard Deviation	t
Print				
Female	10	2.80	11.44	0.63
Male	35	0.00	12.52	
Aural				
Female	10	-0.70	6.31	-0.89
Male	35	2.14	9.52	
Interactive				
Female	10	4.80	12.71	0.19
Male	35	4.14	8.64	
Visual				
Female	10	5.50	8.78	0.64
Male	35	3.03	11.14	
Haptic				
Female	10	3.80	7.74	0.99
Male	35	-0.46	12.84	
Kinesthetic				
Female	10	8.80	14.30	-0.32
Male	35	10.26	11.99	
Olfactory				
Female	10	-12.70	19.44	1.35
Male	35	-21.31	9.85	

*Significant at 0.05 level
Critical t-value = 2.07

TABLE XIV

RESULTS OF T TEST OF MMPALT II SCORES FOR SEX GROUPS

Style/Sex	N	Mean	Standard Deviation	t
Print				
Female	10	2.90	1.91	0.23
Male	35	2.74	1.93	
Aural				
Female	10	4.50	1.96	1.37
Male	35	3.49	2.09	
Interactive				
Female	10	4.80	2.94	0.34
Male	35	4.49	2.52	
Visual				
Female	10	6.60	1.78	0.84
Male	35	5.86	2.64	
Haptic				
Female	10	5.30	1.95	2.34*
Male	35	3.63	2.00	
Kinesthetic				
Female	10	3.40	1.65	0.55
Male	35	3.06	1.76	
Olfactory				
Female	10	2.20	1.48	1.67
Male	35	1.17	1.77	

*Significant at 0.05 level
Critical t value = 2.07

TABLE XV

RESULTS OF T TEST OF PMPS SCORES
FOR MARITAL STATUS GROUPS

Style	N	Mean	Standard Deviation	t
Print				
Married	37	0.54	12.83	-0.10
Single	8	1.00	9.56	
Aural				
Married	37	1.46	9.35	-0.08
Single	8	1.75	7.11	
Interactive				
Married	37	4.14	10.08	-0.23
Single	8	5.00	6.95	
Visual				
Married	37	4.19	11.44	1.32
Single	8	0.75	5.06	
Haptic				
Married	37	2.62	10.48	2.76*
Single	8	-9.38	14.06	
Kinesthetic				
Married	37	9.08	13.40	-1.78
Single	8	13.88	4.36	
Olfactory				
Married	37	-19.81	13.08	-0.46
Single	8	17.50	12.43	

*Significant at 0.05 level
Critical t value = 2.07

TABLE XVI

RESULTS OF T TEST OF MMPALT II SCORES
FOR MARITAL STATUS GROUPS

Style	N	Mean	Standard Deviation	t
Print				
Married	37	2.73	1.87	-0.36
Single	8	3.00	2.20	
Aural				
Married	37	3.73	2.17	0.13
Single	8	3.63	1.77	
Interactive				
Married	37	4.49	2.69	-0.38
Single	8	4.88	2.17	
Visual				
Married	37	5.95	2.44	-0.44
Single	8	6.38	2.77	
Haptic				
Married	37	4.11	2.16	0.74
Single	8	3.50	1.77	
Kinesthetic				
Married	37	3.24	1.79	0.92
Single	8	2.63	1.41	
Olfactory				
Married	37	1.32	1.84	-0.62
Single	8	1.75	1.28	

*Significant at 0.05 level
Critical t value = 2.07

Education Groups

The subjects were categorized into six groups by education level as follows:

Level of Education	Number	Percent
Some high school	5	11
High school diploma	11	25
Some college	15	33
Bachelor's degree	8	18
Master's degree	4	9
Doctor's degree	2	4

An analysis of variance was performed for level of education, as presented in Tables XVII and XVIII, with a significant difference in the MMPALT II visual scores. Table XIX shows that the visual MMPALT II mean score was highest for those subjects with a doctoral degree, followed by those with some high school, master's degree, high school diploma, some college, and, with the lowest mean score, those with a bachelor's degree.

The small numbers of subjects in most of the education groups suggested that this result may have been for differences in scores of subjects, grouped according to whether or not they had a college degree, indicated no differences in any PMPS or MMPALT II scores by education level; the t-test result for the MMPALT II visual score is also shown in Table XIX.

Income Groups

The subjects were categorized into six groups by income as follows:

Level of Income	Number	Percent
Less than $20,000	7	16
$20,000 to $25,000	6	13
$25,000 to $30.000	4	9

TABLE XVII

RESULTS OF ANALYSIS OF VARIANCE OF PMPS SCORES FOR EDUCATION GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	5	918.48	183.70	1.27
	Within groups	39	5,652.10	144.93	
	Total	44	6,570.58		
Aural	Among groups	5	718.70	143.74	2.01
	Within groups	39	2,782.54	71.35	
	Total	44	3,501.24		
Interactive	Among groups	5	77.11	15.42	0.15
	Within groups	39	3,920.13	100.52	
	Total	44	3,997.24		
Visual	Among groups	5	898.45	179.69	1.72
	Within groups	39	4,066.53	104.27	
	Total	44	4,964.98		
Haptic	Among groups	5	1,168.46	233.69	1.78
	Within groups	39	5,116.79	131.20	
	Total	44	6,285.24		
Kinesthetic	Among groups	5	848.52	169.70	1.12
	Within groups	39	5,896.28	151.19	
	Total	44	6,744.80		
Olfactory	Among groups	5	873.51	174.70	1.06
	Within groups	39	6,401.29	164.14	
	Total	44	7,274.80		

*Significant at 0.05 level
Critical F value = 2.45

TABLE XVIII

RESULTS OF ANALYSIS OF VARIANCE OF MMPALT II SCORES FOR EDUCATION GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	5	12.83	2.57	0.68
	Within groups	39	146.95	3.77	
	Total	44	159.78		
Aural	Among groups	5	25.99	5.20	1.23
	Within groups	39	165.26	4.24	
	Total	44	191.24		
Interactive	Among groups	5	59.01	11.80	1.95
	Within groups	39	236.10	6.05	
	Total	44	295.11		
Visual	Among groups	5	65.21	13.04	2.50*
	Within groups	39	203.77	5.22	
	Total	44	268.98		
Haptic	Among groups	5	29.07	5.81	1.39
	Within groups	39	162.93	4.18	
	Total	44	192.00		
Kinesthetic	Among groups	5	13.37	2.67	0.89
	Within groups	39	117.83	3.02	
	Total	44	131.20		
Olfactory	Among groups	5	16.13	3.23	1.06
	Within groups	39	118.67	3.04	
	Total	44	134.80		

*Significant at 0.05 level
Critical F value = 2.45

TABLE XIX

MMPALT II MEAN SCORES AND T TEST
FOR VISUAL LEARNING STYLE

Education Level	Number	Mean Score	t
Mean Scores for Six Educational Levels			
Some high school	5	7.40	
High school diploma	11	5.82	
Some college	15	5.73	
Bachelor's degree	8	4.50	
Master's degree	4	7.00	
Doctor's degree	2	10.00	
t-test for Two Educational Levels			
College graduate	14	6.00	
Non-graduate	31	6.03	-0.04

*Significant at 0.05 level
Critical t Value = 2.07

$30,000 to $40,000	12	26
$40,000 to $50,000	9	20
Over $50,000	7	16

An analysis of variance was performed for level of income, as presented in Tables XX and XXI, with a significant difference in the PMPS haptic score. However, no significant difference by income level was found for any of the MMPALT II scores.

State of Residence Groups

The subjects were categorized into two groups by state of residence as follows:

State of Residence	Number	Percent
Florida	22	49
Oklahoma	23	51

A t-test for difference in scores by state of residence was performed as shown in Tables XXII and XXIII. Both the PMPS and MMPALT II scores for the interactive style were found to be significantly higher for subjects residing in Florida.

Handicap Status Groups

The subjects were categorized into four groups by handicap as follows:

Handicap Status	Number	Percent
Hearing	1	2
Physical	3	7
Visual	8	18
None	33	73

An analysis of variance was performed for handicap status as shown in Tables XXIV and XXV. No significant differences by handicap status was

TABLE XX

RESULTS OF ANALYSIS OF VARIANCE OF PMPS SCORES FOR INCOME GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	5	245.05	49.01	0.30
	Within groups	39	6,325.53	162.19	
	Total	44	6,570.58		
Aural	Among groups	5	536.35	107.27	1.41
	Within groups	39	2,964.89	76.02	
	Total	44	3,501.24		
Interactive	Among groups	5	276.01	55.20	0.58
	Within groups	39	3,721.23	95.21	
	Total	44	3,997.23		
Visual	Among groups	5	443.01	88.60	0.76
	Within groups	39	4,521.96	115.95	
	Total	44	4,964.98		
Haptic	Among groups	5	1,705.50	341.10	2.90*
	Within groups	39	4,579.75	117.43	
	Total	44	6,285.24		
Kinesthetic	Among groups	5	844.98	169.00	1.12
	Within groups	39	5,899.82	151.28	
	Total	44	6,744.80		
Olfactory	Among groups	5	783.20	156.64	0.94
	Within groups	39	6,461.60	166.45	
	Total	44	7,274.80		

*Significant at 0.05 level
Critical F value = 2.45

TABLE XXI

RESULTS OF ANALYSIS OF VARIANCE OF MMPALT II SCORES FOR INCOME GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	5	12.60	2.52	0.67
	Within groups	39	147.17	3.77	
	Total	44	159.78		
Aural	Among groups	5	27.67	5.53	1.32
	Within groups	39	162.57	4.19	
	Total	44	191.24		
Interactive	Among groups	5	33.66	6.73	1.00
	Within groups	39	261.45	6.70	
	Total	44	295.11		
Visual	Among groups	5	45.03	9.01	1.57
	Within groups	39	223.95	5.74	
	Total	44	268.98		
Haptic	Among groups	5	11.11	2.22	0.48
	Within groups	39	180.89	4.64	
	Total	44	192.00		
Kinesthetic	Among groups	5	12.86	2.57	0.85
	Within groups	39	118.34	3.03	
	Total	44	131.20		
Olfactory	Among groups	5	5.98	1.20	0.36
	Within groups	39	128.82	3.30	
	Total	44	134.80		

*Significant at 0.05 level
Critical F value = 2.45

TABLE XXII

RESULTS OF T TEST OF PMPS SCORES
FOR STATE OF RESIDENCE GROUPS

Style	N	Mean	Standard Deviation	t
Print				
Florida	22	0.41	11.92	-0.11
Oklahoma	23	0.83	12.77	
Aural				
Florida	22	3.14	9.56	1.20
Oklahoma	23	-0.04	8.17	
Interactive				
Florida	22	8.05	9.08	2.78*
Oklahoma	23	0;70	8.68	
Visual				
Florida	22	1.82	8.46	-1.09
Oklahoma	23	5.26	12.30	
Haptic				
Florida	22	1.68	9.17	0.66
Oklahoma	23	-.065	14.24	
Kinesthetic				
Florida	22	10.36	12.54	0.23
Oklahoma	23	9.52	12.49	
Olfactory				
Florida	22	-18.41	14.11	0.05
Oklahoma	23	-20.35	11.77	

*Significant at 0.05 level
Critical t value - 2.07

TABLE XXIII

RESULTS OF T TEST OF MMPALT II SCORES
FOR STATE OF RESIDENCE GROUPS

Style	N	Mean	Standard Deviation	t
Print				
Florida	22	2.82	1.97	0.14
Oklahoma	23	2.74	1.89	
Aural				
Florida	22	4.18	2.04	1.50
Oklahoma	23	3.26	2.07	
Interactive				
Florida	22	5.41	2.20	2.26*
Oklahoma	23	3.74	2.72	
Visual				
Florida	22	5.73	2.27	-0.78
Oklahoma	23	6.30	2.67	
Haptic				
Florida	22	4.27	2.00	0.85
Oklahoma	23	3.74	2.18	
Kinesthetic				
Florida	22	3.55	1.79	1.59
Oklahoma	23	2.74	1.60	
Olfactory				
Florida	22	1.68	2.23	1.04
Oklahoma	23	1.13	1.10	

*Significant at 0.05 level
Critical t value = 2.07

TABLE XXIV

RESULTS OF ANALYSIS OF VARIANCE OF PMPS SCORES FOR HANDICAP STATUS GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	3	389.00	129.67	0.86
	Within groups	41	6,181.58	150.77	
	Total	44	6,570.58		
Aural	Among groups	3	99.85	33.28	0.40
	Within groups	41	3,401.39	82.96	
	Total	44	3,501.24		
Interactive	Among groups	3	541.06	180.35	2.14
	Within groups	41	2,456.18	84.30	
	Total	44	3,997.24		
Visual	Among groups	3	223.04	74.35	0.64
	Within groups	41	4,741.94	115.66	
	Total	44	4,964.98		
Haptic	Among groups	3	954.98	318.33	2.45
	Within groups	41	5,330.27	130.01	
	Total	44	6,285.24		
Kinesthetic	Among groups	3	434.20	144.73	0.94
	Within groups	41	6,310.60	153.92	
	Total	44	6,744.80		
Olfactory	Among groups	3	206.62	68.87	0.40
	Within groups	41	7,068.18	172.39	
	Total	44	7,274.80		

*Significant at 0.05 level
Critical F value = 2.84

TABLE XXV

RESULTS OF ANALYSIS OF VARIANCE OF MMPALT II SCORES FOR HANDICAP STATUS GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	3	2.64	0.88	0.23
	Within groups	41	157.14	3.83	
	Total	44	159.78		
Aural	Among groups	3	10.64	3.55	0.81
	Within groups	41	180.60	4.40	
	Total	44	191.24		
Interactive	Among groups	3	20.99	7.00	1.05
	Within groups	41	274.12	6.69	
	Total	44	295.11		
Visual	Among groups	3	9.59	3.20	0.51
	Within groups	41	259.39	6.33	
	Total	44	268.98		
Haptic	Among groups	3	9.59	3.20	0.72
	Within groups	41	182.41	4.45	
	Total	44	192.00		
Kinesthetic	Among groups	3	7.42	2.47	0.82
	Within groups	41	123.78	3.02	
	Total	44	131.20		
Olfactory	Among groups	3	5.38	1.79	0.57
	Within groups	41	129.42	3.16	
	Total	44	134.80		

*Significant at 0.05 level
Critical F value = 2.84

found in any of the scores.

Smoking Status Groups

The subjects were categorized into two groups by smoking status as follows:

Smoking Status	Number	Percent
Nonsmoker	26	58
Smoker	19	42

A t-test for difference in scores by smoking status was performed, as shown in Tables XXVI and XXVII. Neither the PMPS nor MMPALT II scores were found to be significantly different for smokers and nonsmokers.

Handedness Groups

The subjects were categorized into two groups by handedness as follows:

Handedness	Number	Percent
Right-handed	39	87
Left-handed	6	13

A t-test for differences in scores by handedness was performed as shown in Tables XXVIII and XXIX. No significantly different scores were found for right- and left-handed subjects.

Area Born Groups

The subjects were categorized into three groups by the type of area in which they were born as follows:

TABLE XXVI

RESULTS OF T TEST OF PMPS SCORES
FOR SMOKING STATUS GROUPS

Style	N	Mean	Standard Deviation	t
Print				
Nonsmoker	26	-0.50	11.38	-0.72
Smoker	19	2.16	13.45	
Aural				
Nonsmoker	26	0.15	7.88	-1.20
Smoker	19	3.37	10.10	
Interactive				
Nonsmoker	26	5.42	9.46	0.93
Smoker	19	2.74	9.66	
Visual				
Nonsmoker	26	4.38	8.42	0.55
Smoker	19	2.47	13.23	
Haptic				
Nonsmoker	26	1.19	10.97	0.46
Smoker	19	-0.47	13.43	
Kinesthetic				
Nonsmoker	26	12.31	11.53	1.53
Smoker	19	6.68	13.07	
Olfactory				
Nonsmoker	26	-19.08	12.82	0.20
Smoker	19	-19.84	13.24	

*Significant at 0.05 level
Critical t value = 2.07

TABLE XXVII

RESULTS OF T TEST OF MMPALT II SCORES
FOR SMOKING STATUS GROUPS

Style	N	Mean	Standard Deviation	t
Print				
Nonsmoker	26	2.58	1.96	-0.82
Smoker	19	3.05	1.84	
Aural				
Nonsmoker	26	3.69	2.04	-0.07
Smoker	19	3.74	2.21	
Interactive				
Nonsmoker	26	4.27	2.05	-0.81
Smoker	19	4.95	3.21	
Visual				
Nonsmoker	26	5.73	2.41	-0.92
Smoker	19	6.42	2.57	
Haptic				
Nonsmoker	26	4.12	2.10	0.43
Smoker	19	3.84	2.12	
Kinesthetic				
Nonsmoker	26	3.08	1.74	-0.25
Smoker	19	3.21	1.75	
Olfactory				
Nonsmoker	26	1.19	1.30	-0.86
Smoker	19	1.68	2.24	

*Significant at 0.05 level
Critical t value = 2.07

TABLE XXVIII

RESULTS OF T TEST OF PMPS SCORES
FOR HANDEDNESS GROUPS

Style	N	Mean	Standard Deviation	t
Print				
Left	6	6.33	13.62	1.24
Right	39	-0.26	11.94	
Aural				
Left	6	4.83	5.12	0.98
Right	39	1.00	9.31	
Interactive				
Left	6	1.67	5.31	-0.72
Right	39	4.69	10.01	
Visual				
Left	6	2.00	11.52	-0.39
Right	39	3.82	10.62	
Haptic				
Left	6	0.00	17.88	-0.11
Right	39	0.56	11.10	
Kinesthetic				
Left	6	3.83	11.02	-1.31
Right	39	10.87	12.44	
Olfactory				
Left	6	-25.50	9.97	-1.26
Right	39	-18.46	13.10	

*Significant at 0.05 level
Critical t value = 2.07

TABLE XXIX

RESULTS OF T TEST OF MMPALT II SCORES
FOR HANDEDNESS GROUPS

Style	N	Mean	Standard Deviation	t
Print				
Left	6	2.00	1.79	-1.08
Right	39	2.90	1.92	
Aural				
Left	6	2.50	1.87	-1.55
Right	39	3.90	2.07	
Interactive				
Left	6	2.83	2.14	-1.79
Right	39	4.82	2.57	
Visual				
Left	6	5.67	2.50	-0.37
Right	39	6.08	2.50	
Haptic				
Left	6	3.00	2.45	-1.27
Right	39	4.15	2.02	
Kinesthetic				
Left	6	2.50	1.22	-0.96
Right	39	3.23	1.78	
Olfactory				
Left	6	0.83	1.33	-0.85
Right	39	1.49	1.80	

*Significant at 0.05 level
Critical t value = 2.07

Area Born	Number	Percent
Rural	16	35
Suburban	12	27
Urban	17	38

An analysis of variance was performed for area born, as presented in Tables XXX and XXXI. Although the PMPS interactive score varied by the type of area in which subjects were born, no significant difference was found in any of the MMPALT II scores by area born.

Area Reared Groups

The subjects were categorized into three groups by the type of area in which they were reared, as follows:

Area Reared	Number	Percent
Rural	19	42
Suburban	13	29
Urban	13	29

An analysis of variance was performed for area reared, as shown in Tables XXXII and XXXIII. Although the PMPS interactive score varied by the type of area in which subjects were reared, as it did by area born, no significant difference was found in any of the MMPALT II scores by area reared, as was the case for area born.

Continuing Education Groups

The subjects were categorized into two groups, according to whether or not they were involved in some type of continuing education program, as follows:

Continuing Education	Number	Percent
No	28	62
Yes	17	38

TABLE XXX

RESULTS OF ANALYSIS OF VARIANCE OF PMPS SCORES FOR AREA BORN GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	2	75.60	37.80	0.24
	Within groups	42	6,494.98	154.64	
	Total	44	6,570.58		
Aural	Among groups	2	297.26	148.63	1.95
	Within groups	42	3,203.99	76.29	
	Total	44	3,501.24		
Interactive	Among groups	2	840.67	420.33	5.59*
	Within groups	42	3,156.57	75.16	
	Total	44	3,997.24		
Visual	Among groups	2	50.51	25.25	0.22
	Within groups	42	4,914.47	117.01	
	Total	44	4,964.98		
Haptic	Among groups	2	525.61	262.81	1.92
	Within groups	44	5,759.63	137.13	
	Total	44	6,285.24		
Kinesthetic	Among groups	2	212.07	106.04	0.68
	Within groups	42	6,532.73	155.54	
	Total	44	6,744.80		
Olfactory	Among groups	2	15.45	7.72	0.04
	Within groups	42	7,259.35	172.84	
	Total	44	7274.80		

*Significant at 0.05 level
Critical F value = 3.23

TABLE XXXI

RESULTS OF ANALYSIS OF VARIANCE OF MMPALT II SCORES FOR AREA BORN GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	2	2.63	1.31	0.35
	Within groups	42	157.15	3.74	
	Total	44	159.78		
Aural	Among groups	2	20.95	10.47	2.58
	Within groups	42	170.30	4.05	
	Total	44	191.24		
Interactive	Among groups	2	17.29	8.64	1.31
	Within groups	42	277.82	6.61	
	Total	44	295.11		
Visual	Among groups	2	5.68	2.84	0.45
	Within groups	42	263.30	6.27	
	Total	44	268.98		
Haptic	Among groups	2	0.12	0.06	0.01
	Within groups	42	191.88	4.57	
	Total	44	192.00		
Kinesthetic	Among groups	2	3.78	1.89	0.62
	Within groups	42	127.42	3.03	
	Total	44	131.20		
Olfactory	Among groups	2	4.00	2.00	0.64
	Within groups	42	130.80	3.11	
	Total	44	134.80		

*Significant at 0.05 level
Critical F value = 3.23

TABLE XXXII

RESULTS OF ANALYSIS OF VARIANCE OF PMPS SCORES FOR AREA REARED GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	2	9.85	4.92	0.03
	Within groups	42	6,560.73	156.21	
	Total	44	6,570.58		
Aural	Among groups	2	54.09	27.04	0.33
	Within groups	42	3,447.16	82.08	
	Total	44	3,501.24		
Interactive	Among groups	2	551.33	275.67	3.36*
	Within groups	42	3,445.91	82.05	
	Total	44	3,997.24		
Visual	Among groups	2	131.59	65.80	0.57
	Within groups	42	4,833.38	115.08	
	Total	44	4,964.98		
Haptic	Among groups	2	21.45	10.72	0.07
	Within groups	42	6,263.80	149.14	
	Total	44	6,285.24		
Kinesthetic	Among groups	2	94.94	47.47	0.30
	Within groups	42	6,649.86	158.33	
	Total	44	6,744.80		
Olfactory	Among groups	2	19.62	9.81	0.06
	Within groups	42	7,255.18	172.74	
	Total	44	7,274.80		

*Significant at 0.05 level
Critical F value = 3.23

TABLE XXXIII

RESULTS OF ANALYSIS OF VARIANCE OF MMPALT II SCORES FOR AREA REARED GROUPS

Style	Source of Variation	df	SS	MS	F
Print	Among groups	2	14.22	7.11	2.05
	Within groups	42	145.55	3.47	
	Total	44	159.78		
Aural	Among groups	2	18.82	9.41	
	Within groups	42	172.42	4.11	
	Total	44	191.24		
Interactive	Among groups	2	5.34	2.68	0.39
	Within groups	42	289.76	6.90	
	Total	44	295.11		
Visual	Among groups	2	4.72	2.36	0.37
	Within groups	42	264.26	6.29	
	Total	44	268.98		
Haptic	Among groups	2	3.43	1.72	0.38
	Within groups	42	188.57	4.49	
	Total	44	192.00		
Kinesthetic	Among groups	2	1.20	0.60	0.19
	Within groups	42	130.00	3.10	
	Total	44	131.20		
Olfactory	Among groups	2	8.89	4.44	1.48
	Within groups	42	125.91	3.00	
	Total	44	134.80		

*Significant at 0.05 level
Critical F value = 3.23

A t-test for difference in scores by enrollment status in continuing education was performed, as shown in Tables XXXIV and XXXV. Enrollment status in continuing education had no significant impact on PMPS or MMPALT II scores.

Order of Testing Groups

The subjects were categorized into two groups, according to the order in which the PMPS and MMPALT II test were administered, as follows:

Order of Testing	Number	Percent
MMPALT II first	22	49
PMPS first	23	51

A t-test for difference in scores by order of testing was performed, as shown in Tables XXXVI and XXXVII. Those who took the MMPALT II test first scored higher on the PMPS test than did those who took the PMPS test first, as shown in Table XXXVI. However, as shown in Table XXXVII, the MMPALT II scores did not vary significantly by the order in which the two instruments were administered.

Research Questions

The five research questions considered in this study were addressed on the basis of the data analysis findings. The findings regarding the research questions are summarized as follows.

Research Question One

The first research question asked whether the seven learning styles manifest themselves in prime-year adult learners. The PMPS and

TABLE XXXIV

RESULTS OF T TEST OF PMPS SCORES FOR CONTINUING EDUCATION GROUPS

Style	N	Mean	Standard Deviation	t
Print				
No	28	1.07	13.39	0.31
Yes	17	-0.12	10.57	
Aural				
No	28	2.54	10.20	1.11
Yes	17	-0.18	6.21	
Interactive				
No	28	5.57	8.85	1.16
Yes	17	2.18	10.49	
Visual				
No	28	5.68	10.77	1.74
Yes	17	0.12	9.69	
Haptic				
No	28	1.39	10.81	0.65
Yes	17	-1.00	13.85	
Kinesthetic				
No	28	7.93	13.52	-1.41
Yes	17	13.24	9.72	
Olfactory				
No	28	-20.14	13.26	-0.49
Yes	17	-18.18	12.46	

*Significant at 0.05 level
Critical t value = 2.07

TABLE XXXV

RESULTS OF T TEST OF MMPALT II SCORES
FOR CONTINUING EDUCATION GROUPS

Style	N	Mean	Standard Deviation	t
Print				
No	28	2.93	1.92	0.68
Yes	17	2.53	1.91	
Aural				
No	28	3.93	2.02	0.90
Yes	17	3.35	2.21	
Interactive				
No	28	4.79	2.60	0.76
Yes	17	4.18	2.60	
Visual				
No	28	6.04	2.46	0.05
Yes	17	6.00	2.57	
Haptic				
No	28	3.89	2.13	-0.44
Yes	17	4.18	2.07	
Kinesthetic				
No	28	3.21	1.95	0.40
Yes	17	3.00	1.32	
Olfactory				
No	28	1.36	2.02	-0.23
Yes	17	1.47	1.23	

*Significant at 0.05 level
Critical t value = 2.07

TABLE XXXVI

RESULTS OF T TEST OF PMPS SCORES
FOR ORDER OF TESTING GROUPS

Style	N	Mean	Standard Deviation	t
Print				
MMPALT II first	22	4.68	12.15	2.28*
PMPS first	23	-3.26	11.20	
Aural				
MMPALT II first	22	3.64	10.60	1.57
PMPS first	23	-0.52	6.56	
Interactive				
MMPALT II first	22	2.91	10.65	-0.95
PMPS first	23	5.61	8.34	
Visual				
MMPALT II first	22	2.95	10.46	-0.38
PMPS first	23	4.17	10.97	
Haptic				
MMPALT II first	22	-0.73	11.17	-0.66
PMPS first	23	1.65	12.80	
Kinesthetic				
MMPALT II first	22	8.50	11.59	-0.76
PMPS first	23	11.30	13.20	
Olfactory				
MMPALT II first	22	-17.09	15.55	1.17
PMPS first	23	-21.61	9.46	

*Significant at 0.05 level
Critical t value = 2.07

TABLE XXXVII

RESULTS OF T TEST OF MMPALT II SCORES
FOR ORDER OF TESTING GROUPS

Style	N	Mean	Standard Deviation	t
Print				
MMPALT II first	22	2.73	2.07	-0.17
PMPS first	23	2.83	1.77	
Aural				
MMPALT II first	22	3.59	2.09	-0.37
PMPS first	23	3.83	2.12	
Interactive				
MMPALT II first	22	5.00	2.41	1.13
PMPS first	23	4.13	2.74	
Visual				
MMPALT II first	22	5.73	2.25	-0.78
PMPS first	23	6.30	2.69	
Haptic				
MMPALT II first	22	3.77	1.77	-0.17
PMPS first	23	4.22	2.37	
Kinesthetic				
MMPALT II first	22	3.32	1.64	0.70
PMPS first	23	2.96	1.82	
Olfactory				
MMPALT II first	22	1.55	2.18	0.53
PMPS first	23	1.26	1.25	

*Significant at 0.05 level
Critical t value = 2.45

MMPALT II instruments were administered to 45 adults aged 40 to 60, and their rank ordering and scores for the seven styles were evaluated. It was found that the two instruments measured seven distinct learning styles, both as perceived and as empirically demonstrated by each subject, which could be ranked in order of preference or dominance for each subject and for all subjects combined. From Table V, the following summary of learning styles utilized by the sample of 45 prime-year adults can be made, based on the number of subjects scoring more than zero on each of the MMPALT II elements.

1. The print style was utilized by 41 (91 percent) of the subjects, with a score range of one to seven.

2. The aural style was utilized by 42 (93 percent) of the subjects, with a score range of one to seven.

3. The interactive style was utilized by 43 (96 percent) of the subjects, with a score range of one to 10.

4. The visual style was utilized by 44 (98 percent) of the subjects, with a score range of two to 10.

5. The haptic style was utilized by 43 (96 percent) of the subjects, with a score range of one to nine.

6. The kinesthetic style was utilized by 43 (96 percent) of the subjects, with a score range of one to seven.

7. The olfactory style was utilized by 31 (69 percent) of the subjects, with a score range of one to 10.

With the ability of the PMPS and MMPALT II instruments to measure seven distinct learning styles that could be ordered by preference, and with a majority of the subjects able to use each of the seven styles in the MMPALT II tests, it was concluded that the seven learning

styles do manifest themselves in prime-year adults.

Research Question Two

The second research question asked whether there are measurable differences in the learning styles of prime-year adult learners. As shown in Tables II through VI and in Figure 1, both the perceived (as measured by PMPS ranks and scores) and the actual (as measured by MMPALT II ranks and scores) learning styles of the subjects could be ranked in order of preference or dominance. The dispersion of the subjects' ranks and scores among the seven learning styles, as shown in Tables II through V, indicated that there are wide differences in learning style preference among individuals. The collective preferences were summarized to show the overall order of learning styles, in Table VI and in Figure 1. The ability of the test instruments to identify and order the learning styles of the subjects, individually and collectively, led to the conclusion that there are measurable differences in the learning styles of prime-year adults.

Research Question Three

The third research question asked whether there are identifiable patterns of dominant learning styles among prime-year adults. MMPALT II ranks and scores were used to order the seven learning styles by preference or dominance, as shown in Tables IV through VI and in Figure 1. The dominant learning style among the 45 subjects was the visual style, with the interactive style ranking second. The weakest learning style among the subjects was the olfactory. Further, as shown in Table IV, the dominant styles for the individual subjects were as

follows, based on MMPALT II ranks:

1. The print style was dominant for none of the subjects.

2. The aural style was dominant for one (2 percent) of the subjects.

3. The interactive style was dominant for seven (16 percent) of the subjects.

4. The visual style was dominant for 22 (49 percent) of the subjects.

5. The haptic style was dominant for two (4 percent) of the subjects.

6. The kinesthetic style was dominant for two (4 percent) of the subjects.

7. The olfactory style was dominant for none of the subjects.

The ability of the PMPS and MMPALT II instruments to identify the dominant styles for individual subjects and for all subjects collectively and to order the styles by subjects' learning style preferences led to the conclusion that there are identifiable patterns of dominant learning styles among prime-year adult learners.

Research Question Four

The fourth research question asked whether prime-year adult learners' self-assessments of their perceptual modalities of learning style exhibit positive correlation with their actual learning styles as measured empirically. PMPS and MMPALT II ranks and scores were evaluated with respect to the degree of correlation between the subjects' perceptions about their learning styles and their performance in empirical assessments of their actual learning styles.

Correlations between individual subjects' PMPS and MMPALT II scores for the seven learning styles indicated that fewer than half (40 percent) of the subjects demonstrated a meaningful correlation between their perceived and actual learning styles. Individual correlations of scores are presented in Table VII and can be summarized as follows:

1. No subjects exhibited high correlation between PMPS and MMPALT II scores.

2. Ten (22 percent) of the subjects exhibited substantial correlation between PMPS and MMPALT II scores.

3. Eight (18 percent) of the subjects exhibited moderate correlation between PMPS and MMPALT II scores.

4. Fourteen (31 percent) of the subjects exhibited low correlation between PMPS and MMPALT II scores.

5. Thirteen (29 percent) of the subjects exhibited negligible correlation between PMPS and MMPALT II scores.

Correlation coefficients for all subjects combined gave no evidence of a significant correlation between perceived and actual learning styles. Tables VIII and IX present correlation coefficients for PMPS and MMPALT II ranks and for scores, respectively. All of the coefficients indicated either low or negligible correlation between perceived and actual learning styles.

No significant correlation coefficients between ranks or between scores were found for any of the seven learning styles, for either individual subjects or for all subjects combined. Therefore, it was concluded that prime-year adult learners' self-assessments of their perceptual modalities of learning style do not exhibit positive correlation with their actual learning styles.

Research Question Five

The fifth research question asked whether there are meaningful differences, by demographic characteristics, in the identifiable patterns of learning styles of prime-year adults. Analysis of variance and t test procedures were applied to the PMPS and MMPALT II scores for each learning style, by each of several demographic characteristics and by the order in which the PMPS and MMPALT II instruments were administered to the subjects. The results, presented in Tables X through XXXVII, indicated that, overall, there were no meaningful differences in the learning styles of the subjects as measured by PMPS and MMPALT II scores. The instances in which significant differences in scores by demographic characteristics were found are summarized as follows:

1. PMPS scores for the haptic and kinesthetic styles varied by age group, but the MMPALT II scores did not support the perceived differences.

2. Younger subjects scored higher on the MMPALT II visual style than did older subjects.

3. Women scored higher on the MMPALT II haptic style than did men, but this finding may not have been valid due to the small number of women in the sample.

4. Married subjects scored higher on the PMPS haptic style, but the MMPALT II scores did not support the perceived differences.

5. MMPALT II scores varied by education group, but this finding may not have been valid due to the small numbers of subjects in most of the six categories of education level. Furthermore, no significant differences in MMPALT II scores of college graduates and non-graduates

was found. These factors suggested that learning styles did not vary significantly by education level.

6. PMPS scores for the haptic style varied by income level, but the MMPALT II scores did not support the perceived differences.

7. Subjects residing in Florida scored higher on the interactive style than did subjects residing in Oklahoma.

8. PMPS scores for the interactive style varied by the type of area in which subjects were born (rural, urban, suburban), but the MMPALT II scores did not verify this perceived difference.

9. PMPS scores for the interactive style varied by the type of area in which subjects were reared (rural, urban, suburban), but the MMPALT II scores did not verify this perceived difference.

Thus, in only two cases did scores appear to vary significantly by demographic characteristics:

1. Younger subjects utilized the visual style better than did older subjects.

2. Florida residents utilized the interactive style better than did Oklahoma residents.

These findings indicated that there were no significant differences, by demographic characteristics, the identifiable patterns of learning styles of prime-year adults.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study evaluated the learning styles of prime-year adults aged 40 to 60. The objective of the study was to extend the findings of previous research on learning styles by evaluating a group of adults not previously studied. In this chapter, the findings of the study are summarized, the conclusions of the research are presented, and recommendations regarding the application of the findings and avenues for future research are set forth.

Summary of Findings

Five research questions were addressed in this study. These questions were:

1. Do the seven learning styles manifest themselves in prime-year adult learners?

2. Are there measurable differences in the learning styles among prime-year adults?

3. Are there identifiable patterns of dominant learning styles among prime-year adult learners?

4. Do prime-year adult learners' self-assessments of their perceptual modalities of learning style exhibit positive correlation with their actual learning styles as measured empirically?

5. Are there meaningful differences, by demographic

characteristics, in the identifiable patterns of learning styles of prime-year adults?

These questions were addressed by an analysis of data for 45 prime-year adults. Ranks and scores for seven learning styles--print, aural, interactive, visual, haptic, kinesthetic, and olfactory--were measured using the PMPS and MMPALT II instruments. The learning styles of the subjects were evaluated by examining correlations between perceptions about learning styles and actual learning styles and by assessing variations in learning styles according to demographic characteristics of subjects and to the sequence in which the PMPS and MMPALT II instruments were administered to the subjects.

Conclusions

The following conclusions were reached in this study, based on the data analysis presented in Chapter IV.

1. Because the subjects demonstrated the use of the seven learning styles, as measured by the MMPALT II instrument, it was concluded that the seven learning styles do manifest themselves in prime-year adult learners.

2. Because the subjects demonstrated differences in their degree of preference of the seven learning styles, as measured by the MMPALT II instrument, it was concluded that there are measurable differences in the learning styles of prime-year adults.

3. Because the subjects demonstrated measurable differences in their preferences or order of dominance of the seven learning styles, as measured by the MMPALT II instrument, it was concluded that there are identifiable patterns of dominant learning styles among prime-

year adult learners.

4. Because the majority of the subjects demonstrated low or negligible correlation between their perceived and actual learning styles, as measured by the PMPS and MMPALT II instruments, it was concluded that prime-year adult learners' self-assessments of their perceptual modalities of learning style do not exhibit positive correlation on their actual learning styles.

5. On the basis of the findings from analysis of variance and t-tests of PMPS and MMPALT II scores for the seven learning styles, it was concluded that there are no meaningful differences, by demographic characteristics in the identifiable patterns of learning styles of prime-year adults. Further, the statistical tests indicated that there are no significant differences in the identifiable patterns of prime-year adult learning styles, by the order in which the PMPS and MMPALT II instruments are administered to subjects.

Recommendations

The findings and conclusions of this study have implications both for current adult educational practices and for future research directions. With respect to current practice, it is recommended that adult education curricula, particularly those directed towards prime-year adult learners, be designed so as to utilize those learning styles found to be dominant and/or relatively preferred, i.e., the visual, interactive, and haptic styles. Curriculum elements that utilize the less preferred learning styles, i.e., aural, kinesthetic, print, and olfactory, should be deemphasized in curriculum development for adult learners.

Recommendations for future research are as follows:

1. In light of the lack of meaningful correlation between the PMPS and MMPALT II measures of learning style, future investigations of learning styles could be simplified by administering only the MMPALT II. With no significant correlation between the learning style measurements by the two instruments, the PMPS provides the researcher with no useful information about the learning styles of his subjects. This recommendation applies both to the researcher testing samples of subjects from previously unevaluated populations of adult learners and to the adult educator testing his students for curriculum design or other administrative purposes.

2. Future evaluations of learning styles could be simplified by not generally administering the olfactory element of the MMPALT II instrument. Because of its low order of preference as a learning style among prime-year adult learners, the olfactory element should be administered only selectively whenever a researcher is interested specifically in evaluating the olfactory learning style.

3. While this study evaluated a wide range of demographic characteristics of prime-year adult learners, some of the demographic groups contained few subjects, thereby limiting some of the evaluations of learning styles by demographic characteristics to only a few groups of each characteristics to only a few groups of each characteristic. Future studies of learning styles should attempt to expand sample sizes, in order to allow more in-depth evaluations of certain characteristics of learners. However, in light of the lack of significant variations in learning styles by many demographic characteristics, it is suggested that the future researcher focus on

a few characteristics of particular interest and seek to expand his number of subjects accordingly to allow in-depth evaluation of those few traits of interest.

4. While various studies have assessed the learning styles of particular age groups, it would be useful for the learning styles of different age groups--such as children, teenagers, young adults, prime-year adults, and older adults--to be evaluated on a comparative basis. The findings of such a study could be useful in developing better guidelines for curriculum development across the spectrum of the educational system.

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APPENDIXES

APPENDIX A

LETTER OF PERMISSION TO USE

THE LEARNING STYLE TEST

Robert L. McElrath
COMMISSIONER

TENNESSEE
STATE DEPARTMENT OF EDUCATION
100 CORDELL HULL BUILDING
NASHVILLE 37219

November 23, 1983

Dr. Waynne James
Occupational and Adult Education
406 Classroom Building
Oklahoma State University
Stillwater, Oklahoma 74074

Dear Waynne:

I am writing to confirm that you have permission of the authors of The MMPACT-II Learning Style Test, to administer the tests, and use the results in a series of doctoral dissertations to be conducted at Oklahoma State University. We are pleased that you are furthering our research. We shall look forward to obtaining the results of your research.

Cordially,

Russell L. French

For the Authors: Russell L. French and Edwin Cherry

RLF:clh

APPENDIX B

SOURCE OF EXTRACTS AND OILS USED FOR THE OLFACTORY LEARNING STYLE MEASUREMENT

1.	Cherry	Watkins Inc., Winona, MN.
2.	Vanilla	Watkins
3.	Almond	Watkins
4.	Raspberry	Watkins
5.	Pineapple	Watkins
6.	Brandy	Crown Colony Safeway
7.	Rum	Watkins
8.	Banana	Watkins
9.	Maple	Watkins
10.	Wintergreen	McKesson Laboratories Dublin, CA
11.	Peppermint	Watkins
12.	Strawberry	Watkins
13.	Orange	Watkins
14.	Butter	Watkins
15.	Chocolate	Watkins
16.	Coconut	Watkins
17.	Anise (Licorice)	Wagner Ivyland, PA
18.	Cloves	Hunco Laboratory, Texarkana, TX
19.	Lemon	Watkins
20.	Cinnamon	Sucker Shapeos, Salt Lake City, UT.

APPENDIX C

ORGANIZATIONAL AND OPERATIONAL PROCEDURES

FOR THE MMPALT AND THE PMPS

1. Review checklist and assure all equipment is in place and operational.

2. Greet subject and give introduction (see outline).

3. Have subject complete subject's record form.

4. B-identified subjects will complete the PMPS before completing the MMPALT.

5. Administer the MMPALT (Follow procedures for seven parts).

6. A-identified subjects will complete the PMPS after completing MMPALT.

7. Hand score the PMPS.

8. Score the MMPALT and complete subject's record form.

9. Complete check sheet and deliver to subject. (Be sure to answer any questions the subject has).

1. General:
   - One or two trained evaluators
   - Quiet and comfortable room
   - Chairs for evaluator/s and subject
   - Desk or table
   - Subject's Record form
   - Pencils
2. Introduction:
   - Outline
   - 35mm carosel projector
   - Projector screen
   - Demonstration materials, wooden block, 2 bottles and blindfold
3. PMPS:
   - Instruction sheet and questions
   - Answer sheet
4. Print Test (P):
   - Instruction/outline
   - Slides (print test)
   - Response sheet "A"
   - Answer key "A"
5. Aural test (A):
   - Instruction/outline
   - Audiotape cassette recorder
   - Response sheet "B"
   - Answer key "B"
6. Visual test (V)
   - Instruction/outline
   - Slides (visual test)
   - Response sheet "C"
   - Answer key "C"

7. Interactive test (I) - Instruction/outline
   - Response sheet "D"
8. Haptic test (H) - Instruction/outline
   - Box of 20 stimulus/response items
   - Blindfold
   - Response sheet "E"
9. Kinesthetic test (K) - Instruction/outline
   - Blindfold
   - Response sheet "F"
10. Olfactory test (O) - Instruction/outline
    - Blindfold
    - Aroma bottles (20)
    - Response sheet "G"
11. Conclusion - Check sheet "H"
    - PMPS Worksheet

OUTLINE FOR THE RESEARCHER TO INTRODUCE LEARNING STYLE MEASUREMENT EXERCISES TO INDIVIDUAL SUBJECTS

1. Introduction:

NOTE: The purpose of this introduction is to stimulate each subject's interest and enthusiasm toward learning more about their individual uniqueness as a learner. Adjust the presentation to each subject's apparent needs but do not use excessive detail.

YOU ARE ABOUT TO COMPLETE SEVERAL LEARNING EXERCISES TO DETERMINE YOUR STRONGEST LEARNING STYLE OR STYLES. AFTER THE EXERCISES ARE COMPLETEED, YOU WILL BE ADVISED AS TO YOUR STRENGTHS AND WEAKNESSES AS A LEARNER. KNOWLEDGE OF THIS INFORMATION CAN HELP YOU IN FUTURE LEARNING SITUATIONS.

2. Background (Develop the following points):

- EACH OF US ARE DIFFERENT FROM OTHERS
- ONE OF THE PRIMARY DIFFERENCES IS THE MANNER IN WHICH WE LEARN
- THIS MIGHT BE NOTED BY THE MANNER IN WHICH WE RECEIVE, PROCESS RETRIEVE, OR USE NEW KNOWLEDGE OR INFORMATION.
- ONE CONCEPT OF HOW WE RECEIVE KNOWLEDGE AND INFORMATION INCLUDES SEVEN LEARNING STYLES (Briefly explain each):
  - PRINT
  - AURAL
  - INTERACTIVE
  - VISUAL
  - HAPTIC
  - KINESTHETIC

. OLFACTORY

- EACH OF US SHOULD KNOW MORE ABOUT OUR INDIVIDUAL LEARNING STYLES.
- WE CAN LEARN BETTER BY USING OUR STRONGEST STYLE.

(Allow and encourage subject questions and discussion, then proceed to the exercise procedures.)

3. Measurement exercise procedures:
   - IN EACH OF THE SEVEN EXERCISES, YOU WILL BE PRESENTED 10 PAIRS OF THINGS FIRST: WORDS, PICTURES, AROMAS, OBJECTS, ETC. THE FIRST TIEM PRESENTED TO YOU IN EACH PAIR IS CALLED THE STIMULUS, THE SECOND IS CALLED THE RESPONSE. (Show demonstration pairs and point out the stimulus item and the response item.)AFTER ALL 10 PAIRS HAVE BEEN PRESENTED TO YOU, I WILL PRESENT THE STIMULUS ITEM OF EACH PAIR IN A DIFFERENT ORDER FROM THE FIRST PRESENTATION. YOUR TASK WILL BE TO IDENTIFY THE RESPONSE ITEM FOR EACH PAIR FROM MEMORY. (Demonstrate a sample procedure.)
   - REMEMBER THERE IS NO PASSING OR FAILING OF THESE EXERCISES. WE ARE SIMPLY TRYING TO FIND YOUR STRENGTHS AND WEAKNESSES SO YOU CAN BECOME BETTER ABLE TO BUILD ON THE STRENGTHS AND IMPROVE WEAK AREAS.
   - SPECIFIC PROCEDURES WILL BE GIVEN TO YOU FOR EACH EXERCISE.
   - DO YOU HAVE ANY QUESTIONS?

INTRODUCTION

LEARNING STYLE MEASUREMENT EXERCISES

You will be completing several learning exercises to determine your strongest learning style or styles. After the exercises are completed, you will be advised as to your strengths and weaknesses as a learner. It is hoped this knowledge will be helpful to you in future learning situations.

Because we are all different, we have differences in the manner in which we learn. This can be noted through the manner in which we receive, process, retrieve, or use new knowledge or information.

One concept of how we receive knowledge and information includes seven learning styles. These are print, aural, interactive, visual, haptic, kinesthetic and olfactory. In an effort to help each of you better know your strongest style seven exercises will test those learning styles. In each of the seven exercises, you will be presented 10 pairs of things using different learning styles. Coordinators will help you determine your strength in that learning style.

Remember there is no passing or failing of these exercises. We are simply trying to find your strengths and weaknessess so you can become better able to build on the strengths and improve the weak areas.

STATION #1
INTRODUCTION AND GROUP TESTS
(PRINT, AURAL, VISUAL)

REQUIREMENTS:

PEOPLE: 1 or 2 trained evaluators

EQUIPMENT: 1 35 mm Kodak Carousel Slide projector

1 projection screen

1 audiotape cassette recorder

MMPLAT-II MATERIALS: Tray of slides (Print, Visual Tests)

Audio-cassette (Aural Test)

Demonstration materials: wooden block and baseball, two vials, blindfold

Pencils

Response Sheets: Print, Aural, Visual

PROCEDURES:

A. INTRODUCTION:
1) Welcome subjects
2) Introduce concept of learning styles
3) Explain and demonstrate measurement procedures
4) Organize test groups (groups of 4)
5) Respond to Questions

B. PRINT TEST:
1) Be sure subjects can all see screen clearly
2) Distribute response sheets (face down) and pencils
3) Give directions and show sample pair
4) Display stimulus/response pairs at 7 second intervals
5) Instruct subjects to turn response sheets over and pick up pencils
6) Announce number of response and display each stimulus slide for 10 seconds. (For example: "Number one (wait 10 seconds), Number two (wait 10 seconds) etc..."
7) Collect response sheets

NOTE: Pairings and sequence of stimulus/response pairs should be as follows:
Sample: hez/sister

1) biv/cat	6) cyc/horse
2) ceq/party	7) koy/rain
3) puq/name	8) wuq/robin
4) dup/bed	9) lez/paper
5) xib/box	10) nyh/coat

Sequence for stimulus only display:

1) dup	6) nyh
2) cyc	7) ceq
3) koy	8) lez
4) biv	9) puq
5) xib	10) wuq

C. AURAL TEST: 1) Be sure subjects can all hear audiotape well.

2) Distribute response sheets face down.

3) Give directions for the test and demonstrate stimulus/response pair.

4) Play audiotape containing stimulus/response pairs.

5) Instruct subjects to turn response sheets over and prepare to respond.

6) Play audiotape containing stimulus member only (2nd section of audiocassette).

NOTE: Pairings and sequence of stimulus/response pairs should be as follows:

1) vom/apple	6) poh/leg
2) und/baby	7) omp/bread
3) tud/kitten	8) mog/table
4) sul/shoe	9) kiv/rabbit
5) roz/duck	10) jus/bird

Sequence for stimulus only presentation:

1) poh	6) mog
2) omp	7) und
3) jus	8) sul
4) vom	9) kiv
5) tud	10) roz

D. VISUAL TEST: 1) Be sure subjects can all see the screen well.

2) Distribute response sheets (face down).

3) Give directions and show sample pair.

4) Display stimulus/response pairs at 7 second intervals.

5) Instruct subjects to turn response sheets over and prepare to respond.

6) Announce number of response and display each stimulus member for 10 seconds. (For example: "Number one (ten seconds), etc..."

7) Collect answer sheets and pencils.

NOTE: Pairing and sequence of stimulus/response pairs should be as follows:

1) square/tree
2) circle/hat
3) triangle/chair
4) rectangle/boot
5) plus sign/window
6) star/boat
7) oval/flower
8) asterisk/umbrella
9) diamond/scissors
10) infinity sign/eyeglasses

Sequence for stimulus only display:

1) asterisk
2) circle
3) plus sign
4) rectangle
5) infinity sign
6) oval
7) diamond
8) square
9) star
10) triangle

DISMISSAL: 1) Be sure subjects have their group assignments.

2) Direct subject groups to next location(s).

STATION #2

INTERACTIVE TEST

REQUIREMENTS:

PEOPLE: 1-2 trained evaluators

EQUIPMENT: This document and response sheets.

PROCEDURES:

1. Seat subject where he/she is at the same level and face to face with primary evaluator. If a secondary evaluator is used, he/she should sit to one side and prepare to score the responses. Scoring must be accomplished without distracting or prompting the subject.

2. Try to put the subject at ease, but do not waste too much time in pleasantries.

3. Assure subject that procedures are identical to those already encountered in the group tests and give him/her directions for the test:

   EVALUATOR: IN A MOMENT YOU WILL BE BLINDFOLDED, THEN YOU WILL BE GIVEN TEN PAIRS OF WORDS. EACH PAIR CONTAINS A NONSENSE WORD AND A COMMON WORD. AFTER PRESENTING EACH PAIR, I SHALL GIVE YOU AN OPPORTUNITY TO TALK ABOUT HOW YOU INTEND TO REMEMBER THIS PAIRING. AFTER ALL TEN PAIRS OF WORDS HAVE BEEN PRESENTED AND YOU HAVE COMMENTED ON EACH, I SHALL PRESENT YOU ONLY THE STIMULUS OR NONSENSE WORDS AND ASK YOU TO SUPPLY THE COMMON WORD WHICH WAS PAIRED WITH EACH. DO YOU UNDERSTAND THE PROCEDURE?

4. Present stimulus/response pairs using the following script:

   THE NONSENSE WORD IN THIS PAIR IS (STIMULUS), AND THE COMMON WORD IS (RESPONSE). PLEASE REPEAT BOTH WORDS.

   (Repeat as necessary until subject can say both words.)

   How will you remember this pair of words? (you may need to prompt the subject to be sure that he/she will verbalize these words)

   (Allow ten (10) seconds for subject to respond to question.)
   (Do not comment on subject's reply.)

NOTE: Pairings and sequence of stimulus/response pairs should be as follows:

1) zed/wind	6) pex/floor
2) fai/tooth	7) chi/egg
3) ces/ball	8) jec/dog
4) hez/Christmas	9) toz/milk
5) sci/fire	10) zon/toy

5. Present stimulus words and ask the subject to state response words. Use the following script:

THE NONSENSE WORD IS (STIMULUS). WHAT WAS (STIMULUS) PAIRED WITH?

(Allow 10 seconds for the response.)

NOTE: Sequence for stimulus only presentation:

1) hez	6) jec
2) zed	7) toz
3) sci	8) ces
4) chi	9) pex
5) fai	10) zon

6. Primary or secondary evaluator completes scoring without reporting results to subject.

7. Be sure subject's correct name or number is on the score sheet.

8. Instruct subject to move to his/her next station or return to the coordinator for reassignment.

STATION #3

HAPTIC TEST

REQUIREMENTS:

PEOPLE: 1-2 trained evaluators

EQUIPMENT: Small desk or table
Box of 20 stimulus/response items
Blindfold
Response sheets

PROCEDURES:

1. Arrange items on table and cover before subject enters.

2. Seat subject across table from primary evaluator. If a secondary evaluator is used, he/she should sit to one side and prepare to score the responses. Scoring must be accomplished without distracting or prompting the subject.

3. Try to put the subject at ease, but do not waste too much time on pleasantries.

4. Assure subject that procedures are the same as for all of the other tests and give him/her directions as follows:

   EVALUATOR: IN A MOMENT YOU WILL BE BLINDFOLDED. THEN I SHALL PRESENT YOU WITH TEN PAIRS OF ITEMS. EACH PAIR CONTAINS A NONSENSE ITEM AND A COMMON ITEM. NONE OF THE ITEMS WILL HURT YOU NOR FEEL TERRIBLE TO YOU. I SHALL ALWAYS PLACE THE NONSENSE ITEM OF EACH PAIR IN YOUR LEFT HAND, AND THE COMMON ITEM IN YOUR RIGHT HAND. FEEL THE TWO ITEMS IN EACH PAIR CAREFULLY SO THAT YOU WILL BE ABLE TO REMEMBER WHAT THINGS ARE ASSOCIATED WITH EACH OTHER. I WILL MAKE SURE THAT YOU CAN IDENTIFY THE COMMON ITEM. AFTER ALL TEN PAIRS HAVE BEEN PRESENTED, I SHALL PRESENT YOU ONLY THE STIMULUS OR NONSENSE TIMES AND ASK YOU TO IDENTIFY THE COMMON ITEM WHICH WAS PAIRED WITH EACH. DO YOU UNDERSTAND THE PROCEDURE?

5. Blindfold subject and uncover items on the table.

6. Place stimulus member of each pair in subject's left hand; then place corresponding response item in subject's right hand. Allow the subject 7 seconds to handle both objects, then take them from him/her and repeat the procedure with the next pair of items. Be sure subject can identify the common item. He/she will have to name it later.

7. After presenting all ten stimulus/response pairs, instruct the subject that the test is about to begin.

8. Place each stimulus member in the subjects left hand and ask him/her to identify the paired response item:

   PLEASE NAME OR DESCRIBE THE OBJECT WITH WHICH THIS ITEM WAS PAIRED?

(Allow ten (10) seconds for the subject to reply. Do not comment on the subject's reply.)

9. Score is kept without reporting results to the subject.

NOTE: Pairings and sequence of stimulus/response pairs should be as follows:

1) carpet/lightbulb
2) rock/pencil
3) table leg/tennis ball
4) hose coupling/paint brush
5) wood rectangle/table fork
6) bushing/key ring
7) metal tube/scissors
8) odd shaped wood/yo yo
9) plastic golf ball/padlock
10) door knob/drinking glass

Sequence for stimulus only presentation:

1) carpet
2) golf ball
3) odd shaped wood
4) bushing
5) table leg
6) wood rectangle
7) rock
8) door knob
9) metal tube
10) hose coupling

10. Be sure that subject's correct name or number is on response sheet.

11. Instruct subject to move to his/her next station or to return to coordinator for reassignment.

STATION #4

KINESTHETIC TEST

REQUIREMENTS:

PEOPLE: 1-2 Trained evaluators

EQUIPMENT: This document
blindfold
response sheet

PROCEDURES:

1. Seat subject for a few minutes while explaining test. If a secondary evaluator is used, he/she should sit to one side and prepare to score the responses. Scoring must be accomplished without distracting or prompting the subject.

2. Try to put the subject at ease, but do not waste too much time on pleasantries.

3. Assure subject that procedures are the same as for all other tests and give him/her directions as follows:

   EVALUATOR: THIS TEST INVOLVES BODY MOVEMENT: THERE WILL BE LIMITED SPOKEN DIRECTIONS DURING THIS PROCEDURE. FROM THIS (IDENTIFY) STARTING POINT, I'LL GUIDE AND DIRECT YOU THROUGH TEN PAIRS OF BODY MOVEMENTS. YOU WILL BE BLINDFOLDED: THEREFORE I'LL STAY CLOSE BY YOU TO KEEP YOU STEADY AND PREVENT ANY ACCIDENTS. AFTER WE HAVE COMPLETED THE TEN PAIRS OF MOVEMENTS, I'LL GUIDE AND DIRECT YOU THROUGH THE FIRST MOVEMENT OF EACH PAIR. YOU ARE TO RESPOND BY PERFORMING OR DESCRIBING THE MOVEMENT WITH WHICH THE FIRST MOVEMENT WAS PAIRED. DO YOU UNDERSTAND THE PROCEDURE?

4. Blindfold the subject;

5. Move subject through the 10 stimulus/response pairs. As necessary, use the following spoken directions:

   THE FIRST MOVEMENT IS (STIMULUS). IT IS PAIRED WITH (RESPONSE)

   Start each movement by gently placing your hands on the subject's shoulders. The various movements will require gentle movement of the subject's arms and legs. This must be accomplished without alarming the subject in any way. As necessary, you may use additional verbal directions, but those directions must not detract from the actual movements.

6. Move the subject through the various stimulus movements and allow 10 seconds for the subject to respond by performing or describing the paired movements. It may be necessary to say:

   THIS MOVEMENT IS (STIMULUS). WHAT WAS IT PAIRED WITH?

7. Score responses without reporting results to the subject.

8. Be sure that the subject's correct name or number is on the response sheet.

9. Instruct subject to move to his/her next station or to return to coordinator for reassignment.

NOTE: Pairings and sequence pairs should be as follows:

STIMULUS	RESPONSE
1) Move diagonally across room and back	1) Stoop
2) Stand on one leg	2) Raise both hands into air
3) Rotate left arm	3) Bend forward at waist
4) Hands on hips	4) Alternate raising both legs
5) Wrap left arm over head	5) Walk in circle
6) Clasp hands above head then lower to sides	6) Take two steps forward and return
7) Twist body in circle	7) Clasp hands in front of body
8) With right arm, draw a circle in the air	8) Stand with legs spread far apart
9) Cross arms over head	9) Clasp hands behind neck
10) Get on hands and knees	10) Stand at attention (rigid body position)

Sequence for stimulus only presentation:

1) Stand on one leg
2) Get on hands and knees
3) With right arm, draw circle in air
4) Cross arms over head
5) Hands on hips
6) Move diagonally across room and return
7) Clasp hands above head then lower to sides
8) Left arm above head
9) Twist body in circle
10) Rotate left arm

STATION #5

OLFACTORY TEST

REQUIREMENTS:

PEOPLE: 1-2 trained evaluators

EQUIPMENT: Small desk or table
Aroma vials or bottles (20)
Blindfold
Response sheets

PROCEDURES:

1. Arrange aroma bottles on table and cover.

2. Seat subject across table from primary evaluator. If a secondary evaluator is used, he/she should sit to one side and prepare to score the responses. Scoring must be accomplished without distracting or prompting the subject.

3. Try to put the subject at ease, but do not waste too much time on pleasantries.

4. Assure subject that procedures are the same as for all other tests and give him/her directions as follows:

   EVALUATOR: FOR THIS TEST YOU WILL BE BLINDFOLDED AND GIVEN BOTTLES CONTAINING DIFFERENT AROMAS. FIRST, YOU WILL BE PRESENTED WITH PAIRS OF AROMAS. THE FIRST BOTTLE OF EACH PAIR CONTAINS AN ABSTRACT AROMA WHICH WILL NOT BE IDENTIFIED. THE SECOND BOTTLE CONTAINS A COMMON AROMA, AND I WILL IDENTIFY IT FOR YOU. YOUR TASK IS TO REMEMBER WHICH PAIRS OF AROMAS GO TOGETHER. AFTER EXAMINING ALL TEN PAIRS, YOU WILL BE GIVEN THE BOTTLE CONTAINING THE FIRST AROMA IN EACH PAIR. YOU ARE TO IDENTIFY THE NAME OF THE AROMA WITH WHICH IT WAS PAIRED. DO YOU UNDERSTAND THE PROCEDURE?

5. Blindfold the subject.

6. Present the stimulus/response pairs as follows:

   THIS IS THE FIRST AROMA OF THIS PAIR. (Give bottle to subject; help him/her lift it to nose.) THIS IS THE SECOND AROMA OF THIS PAIR (Same procedure).

   Allow the subject 7 seconds to examine each pair of aromas.

7. Present subject with stimulus member bottle of each pair and allow him/her 10 seconds to identify the appropriate response aroma. It may be necessary to say:

   THIS ONE OF THE ABSTRACT AROMAS; WHAT WAS IT PAIRED WITH?

8. Score responses without reporting results to the subject.

9. Be sure subject's correct name or number is on the response sheet.

10. Instruct subject to move to his/her next station or to return to coordinator for reassignment.

NOTE: Pairings and sequence of stimulus/response pairs should be as follows:

1) Cherry
2) Vanilla
3) Almond
4) Raspberry
5) Pineapple
6) Brandy
7) Rum
8) Banana
9) Maple
10) Wintergreen
11) Peppermint
12) Strawberry
13) Orange
14) Butter
15) Chocolate
16) Coconut
17) Anise (licorice)
18) Cloves
19) Lemon
20) Cinnamon

Sequence for stimulus only presentation:

1) Vanilla (#2)
2) Raspberry (#4)
3) Maple (#9)
4) Banana (#8)
5) Cherry (#1)
6) Almond (#3)
7) Pineapple (#5)
8) Rum (#7)
9) Brandy (#6)
10) Wintergreen (#10)

APPENDIX D

PERCEPTUAL MODALITY PREFERENCE SURVEY

SIGN-UP SHEET

TO: Walter Lucas, Jr.
1304 Smoking Tree Road
Moore, Oklahoma 73160

I have read the introduction to the learning styles measurement project, and I would like to be a participant in the project.

Name: _____

Address _____

Telephone Number _____

Signature _____

LEARNING STYLE STUDY - SUBJECTS' RECORD FORM

_____ Name _____ Subject Number

Type of Employment_____

AGE _____ SEX_____ SINGLE_____ MARRIED

WHERE WERE YOU BORN_____: RURAL_____: URBAN_____: SUBURBAN_____

WHERE WERE YOU RAISED _____: RURAL_____: URBAN_____: SUBURBAN_____

DO YOU HAVE ANY OF THE FOLLOWING PHYSICAL HANDICAPS: Visual_____; Hearing_____; Physical__

EDUCATION COMPLETED

____1. Some High School
____2. High School Diploma
____3. Some College
____4. Bachelor's Degree
____5. Master's Degree
____6. Doctor's Degree

Where did you get degrees?_____

_____

Are You Right Handed_____Left Handed_____

Do You Smoke?_____

Are you currently enrolled in any adult learning program. If so, what_____

_____, Where_____

TOTAL FAMILY INCOME
(specify number of contributors)

1. _____ below $20,000.
2. _____ below $25,000.
3. _____ below $30,000.
4. _____ below $40,000.
5. _____ below $50,000.
6. _____ above $50,000.

NUMBER OF CHILDREN

1. _____ None
2. _____ Under 6 yrs old
3. _____ 6 - 12 yrs old
4. _____ 12 - 17 yrs old
5. _____ 18 - 22 yrs old
6. _____ Over 22 yrs old

This survey is designed to help you identify your style of learning. It specifically deals with how you best receive new information or knowledge. The results of this survey will help you plan your future learning experiences.

You will be responding to forty-two statements concerning how you learn best. This is not a test; there are no right or wrong answers. When making your responses, you should consider your past learning experiences and your own intuitions about your learning style.

The response choices are: ALWAYS, USUALLY, SELDOM, and NEVER. The always response indicates that the statement is a strong representation of your learning style preference. If the statement is a good way for you to learn, but not your most preferred, you should mark "usually." If the statement indicates a way you can learn, but you would prefer other methods, mark your response as "seldom." The never response indicates that you reject that statement as a way for you to learn.

The construction of the survey requires that you respond to all statements in the order presented. Therefore, do not omit responses or skip statements.

If you are using the machine scored response sheet, mark column 1 for always, column 2 for usually, column 3 for seldom, and column 4 for never.

1. I can learn better by reading than by listening.
2. I can learn better by listening than by talking with others.
3. I can learn better by talking with others than by looking at things like movies and slides.
4. I can learn better by looking at things like movies and slides than by touching or holding objects.
5. I can learn better by touching or holding objects than by physically participating in activities such as sports or games.
6. I can learn better by physically participating in activities such as sports and games than by smelling things.
7. I can learn better by smelling things than by reading.
8. I can learn better by reading than by talking with others.
9. I can learn better by talking with others than by touching or holding objec
10. I can learn better by touching or holding objects than by smelling things.
11. I can learn better by smelling things than by listening.
12. I can learn better by listening than by looking at things like movies and slides.
13. I can learn better by looking at things like movies and slides than by physically participating in activities such as sports and games.
14. I can learn better by physically participating in activities such as sports and games than by reading.
15. I can learn better by reading than by looking at things like movies and slides.
16. I can learn better by looking at thing like movies and slides than by smelling things.
17. I can learn better by smelling things than by talking with others.
18. I can learn better by talking with others than by physically participating in activities such as sports and games.
19. I can learn better by physically participating in activities such as sports and games than by listening.
20. I can learn better by listening than by touching or holding objects.
21. I can learn better by touching or holding objects than by reading.
22. I can learn better by reading than by smelling things.

23. I can learn better by smelling things than by physically participating in activities such as sports and games.
24. I can learn better by physically participating in activities such as sports and games than by touching or holding objects.
25. I can learn better by touching or holding objects than by looking at things like movies and slides.
26. I can learn better by looking at things like movies and slides than by talking with others.
27. I can lean better by talking with others than by listening.
28. I can learn better by listening than by reading.
29. I can learn better by reading than by physically participating in activities such as sports and games.
30. I can learn better by physically participating in activities such as sports and games than by looking at things like movies and slides.
31. I can learn better by looking at things like movies and slides than by listening.
32. I can learn better by listening than by smelling things.
33. I can learn better by smelling things than by touching or holding objects.
34. I can learn better by touching or holding objects than by talking with others.
35. I can learn better by talking with others than by reading.
36. I can learn better by reading than by touching or holding objects.
37. I can learn better by touching or holcing objects than by listening.
38. I can learn better by listening than by physically participating in activities such as sports and games.
39. I can learn better by physically participating in activities such as sports and games than by talking with others.
40. I can learn better by talking with others than by smelling things.
41. I can learn better by smelling things than by looking at things like movies and slides.
42. I can learn better by looking at things like movies and slides than by reading.

ANSWER SHEET FOR THE PERCEPTUAL MODALITY PREFERENCE SURVEY

You will be responding to forty-two statements concerning how you learn best. This is not a test; there are no right or wrong answers. When making your responses, you should consider your past learning experiences and your own intuitions about your learning style.

The response choices are: ALWAYS, USUALLY, SELDOM, and NEVER. The always response indicates that the statement is a strong representation of your learning style preference. If the statement is a good way for you to learn, but not your most preferred, you should mark "usually." If the statement indicates a way you can learn, but you would prefer other methods, mark your response as "seldom." The never response indicates that you reject that statement as a way for you to learn.

The construction of the survey requires that you respond to all statements in the order presented. Therefore, do not omit responses or skip statements.

	ALWAYS	USUALLY	SELDOM	NEVER
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				
31.				
32.				
33.				
34.				
35.				
36.				
37.				
38.				
39.				
40.				
41.				
42.				

SUBJECT NUMBER_____

PERCEPTUAL MODALITY PREFERENCE SURVEY
SCORING SYSTEM

Each survey statement contains two contrasting perceptual modality elements. Each element is included in 12 different statements; 6 times in the primary or first position and 6 times in the secondary or last position. Each element can therefore, be scored 12 times. When listed in the primary position, the element will be scored: Always = +4, Usually = +2, Seldom = -2, and Never = -4. When listed in the secondary position, the element will be scored: Always = -2, Usually = -1, Seldom = +1, and Never = +2. The maximum possible score range for any element is +36 to -36.

Print Element Statements:

Primary Position: 1, 8, 15, 22, 29, and 36.
Secondary Position: 7, 14, 21, 28, 35, and 42.

Aural Element Statements:

Primary Position: 2, 12, 20, 28, 32, and 38.
Secondary Position: 1, 11, 19, 27, 31, and 37.

Interactive Element Statements:

Primary Position: 3, 9, 18, 27, 35, and 40.
Secondary Position: 2, 8, 17, 26, 34, and 39.

Visual Element Statements:

Primary Position: 4, 13, 16, 26, 31, and 42.
Secondary Position: 3, 12, 15, 25, 30, and 41.

Haptic Element Statements:

Primary Position: 5, 10, 21, 25, 34, and 37.
Secondary Position: 4, 9, 20, 24, 33, and 36.

Kinesthetic Element Statements:

Primary Position: 6, 14, 19, 24, 30, and 39.
Secondary Position: 5, 13, 18, 23, 29, and 38.

Olfactory Element Statements:

Primary Position: 7, 11, 17, 23, 33, and 41.
Secondary Position: 6, 10, 16, 22, 32, and 40.

WORKSHEET FOR HAND-SCORING PERCEPTUAL MODALITY SURVEY

Print:		Aural:		Interactive:	
A 1	28	I 2	27	V 3	26
I 8	35	V 12	31	H 9	34
V 15	42	H 20	37	K 18	39
H 36	21	K 38	19	O 40	17
K 29	14	O 32	11	P 35	8
O 22 ___	7 ___	P 28 ___	1 ___	A 27 ___	2 ___

Visual:		Haptic:		Kinesthetic:	
H 4	25	K 5	24	O 6	23
K 13	30	O 10	33	P 14	29
O 16	41	P 21	36	A 19	38
P 42	15	A 37	20	I 39	18
A 31	12	I 34	9	V 30	13
I 26 ___	3 ___	V 25 ___	4 ___	H 24 ___	5 ___

Olfactory:		Style:	Survey Results: Score:	Rank:	MMPALT Results: Score:	Rank:
P 7	22	Print				
A 11	32	Aural				
I 17	40	Interactive				
V 41	16	Visual				
H 33	10	Haptic				
K 23 ___	6 ___	Kinesthetic				
		Olfactory				

Primary Position: Always +4, Usually +2, Seldom -2, Never -4

Secondary Position: Always -2, Usually -1, Seldom +1, Never +2

APPENDIX E

RESPONSE SHEETS FOR MMPALT

RESPONSE SHEET A

PRINT

LEARNING STYLE

SUBJECT NUMBER: _____

NONSENSE WORD NUMBER:	COMMON WORD:
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____

RESPONSE SHEET B

AURAL

LEARNING STYLE

SUBJECT NUMBER: _____

NONSENSE WORD NUMBER:	COMMON WORD:
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____

RESPONSE SHEET C

VISUAL

LEARNING STYLE

SUBJECT NUMBER: _____

SYMBOL NUMBER:	PICTURE
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____

CHECK SHEET D

INTERACTIVE

LEARNING STYLE

SUBJECT NUMBER: _____

NONSENSE WORD:	COMMON WORD:	SUBJECT CORRECT	RESPONSE INCORRECT
hez			
zed			
sci			
chi			
fai			
jec			
toz			
ces			
pex			
zon			

TOTAL CORRECT: _____

RESPONSE SHEET E
HAPTIC
LEARNING STYLE

SUBJECT NUMBER: _____

STIMULUS MEMBER:	RESPONSE MEMBER:	SUBJECT CORRECT	RESPONSE INCORRECT
PIECE OF CARPET	LIGHT BULB		
PLASTIC GOLF BALL	PADLOCK		
ODD SHAPED PIECE OF WOOD	YO YO		
BUSHING	KEY RING		
TABLE LEG	TENNIS BALL		
WOODEN RECTANGLE	TABLE FORK		
ROCK	PENCIL		
DOOR KNOB	DRINKING GLASS		
METAL TUBE	SCISSORS		
HOSE COUPLING	PAINT BRUSH		

TOTAL CORRECT: _____

RESPONSE SHEET F
KINESTHETIC
LEARNING STYLE

SUBJECT NUMBER: _____

STIMULUS MEMBER:	RESPONSE MEMBER:	SUBJECT CORRECT	RESPONSE INCORRECT
STAND ON ONE LEG	HANDS IN AIR		
GET ON HANDS AND KNEES	STAND AT ATTENTION		
WITH RIGHT ARM, DRAW AN 'O' IN THE AIR	STAND SPREAD EAGLE		
CROSS ARMS OVER HEAD	HANDS BE-HIND HEAD		
HANDS ON HIPS	RAISE BOTH LEGS (ALT.)		
MOVE DIAGONALLY ACROSS ROOM AND RETURN	STOOP		
CLASP HANDS OVER HEAD, LOWER TO SIDE	TAKE TWO STEPS FWD AND RETURN		
LEFT ARM OVER HEAD	WALK IN A CIRCLE		
TWIST BODY IN CIRCLE	CLASP HANDS IN FRONT		
ROTATE LEFT ARM	BEND OVER FORWARD		

TOTAL CORRECT: _____

CHECK SHEET G
OLFACTORY
LEARNING STYLE

SUBJECT NUMBER: _____

STIMULUS NUMBER:	RESPONSE AROMA:	SUBJECT CORRECT	RESPONSE INCORRECT
2	STRAWBERRY		
4	BUTTER		
9	LEMON		
8	OIL OF CLOVES		
1	PEPPERMINT		
3	ORANGE		
5	CHOCOLATE		
7	LICORICE		
6	COCONUT		
10	CINNAMON		

TOTAL CORRECT: _____

CHECK SHEET H PARTICIPANTS REPORT

SUBJECT NUMBER: _____

Your individual survey and the learning style tests have been scored and your results are as follows:

LEARNING STYLE	MMPALT SCORE	MMPALT RANK ORDER	PMPS RANK ORDER
PRINT	_____	_____	_____
AURAL	_____	_____	_____
INTERACTIVE	_____	_____	_____
VISUAL	_____	_____	_____
HAPTIC	_____	_____	_____
KINESTHETIC	_____	_____	_____
OLFACTORY	_____	_____	_____

If these results are a true reflection of your strengths as a learner, the style ranked as #1 is your best method for studying and learning. You might consider using that style as much as possible, and, at the same time, attempt to improve your skills in weaker styles. Example: if aural is your #1 style, you learn best by listening. If print is your #7 style, this would be your weakest style and you should attempt to improve your reading skills.

THANK YOU VERY MUCH FOR BEING A PART OF THIS STUDY.

APPENDIX F

INDIVIDUAL RANKS AND SCORES

Subject Number	Instrument	ELEMENTS Print Rank	Print Score	Aural Rank	Aural Score	Interactive Rank	Interactive Score	Visual Rank	Visual Score	Haptic Rank	Haptic Score	Kinesthetic Rank	Kinesthetic Score	Olfactory Rank	Olfactory Score
1	PMPS	6	-15	3	1	3	1	3	1	2	6	1	24	7	-25
	MMPALT	5	1	5	1	7	0	2	4	2	4	2	4	5	1
2	PMPS	4	-3	2.5	2	2.5	2	5	-8	6	-29	1	20	7	-33
	MMPALT	3	3	4.5	2	2	5	1	8	4.5	2	6.5	1	6.5	1
3	PMPS	5	-12	4	-2	2	4	3	3	7	-25	1	18	6	-22
	MMPALT	6	2	6	2	2	4	2	4	2	4	6	2	4	3
4	PMPS	2	12	3.5	4	5	-6	1	18	6	-12	3.5	4	7	-18
	MMPALT	6	1	4	3	4	3	1	5	2	4	4	3	7	0
5	PMPS	6	-15	4.5	-6	4.5	-6	3	7	2	19	1	29	7	-23
	MMPALT	4	2	2	7	3	5	1	9	7	0	5.5	1	5.5	1
6	PMPS	5	-4	6	-9	4	-1	3	7	2	16	1	28	7	-22
	MMPALT	5.5	2	5.5	2	2	6	2	6	2	6	4	4	7	1
7	PMPS	6	-9	5	-7	3	2	4	-5	1	13	2	10	7	-22
	MMPALT	2.5	2	1	3	5	1	7	0	2.5	2	5	1	5	1
8	PMPS	7	-27	6	-13	4	-1	1	36	3	6	2	12	5	-11
	MMPALT	5.5	4	5.5	4	2	9	2	9	2	9	4	7	7	1
9	PMPS	2	16	1	18	3.5	11	5	3	6	-16	3.5	11	7	-31
	MMPALT	6	2	2.5	4	2.5	4	1	7	4.5	3	4.5	3	7	0

Subject Number	Instrument	ELEMENTS Print Rank	Print Score	Aural Rank	Aural Score	Interactive Rank	Interactive Score	Visual Rank	Visual Score	Haptic Rank	Haptic Score	Kinesthetic Rank	Kinesthetic Score	Olfactory Rank	Olfactory Score
10	PMPS	2	14	1	19	3	7	5	-5	6	-8	4	-2	7	-24
	MMPALT	4.5	2	4.5	2	4.5	2	2	5	4.5	2	1	6	7	1
11	PMPS	1	20	5.5	-4	5.5	-4	2	15	3	0	4	-3	7	-22
	MMPALT	1.5	7	7	2	5.5	3	3	6	1.5	7	4	4	5.5	3
12	PMPS	6	-22	3	9	2	13	5	3	4	4	1	30	7	-24
	MMPALT	2.5	6	6	4	4.5	5	2.5	6	4.5	5	1	7	7	0
13	PMPS	3	3	5	-3	1	20	4	2	6	-6	2	14	7	-23
	MMPALT	3.5	6	5	5	2	7	1	10	3.5	6	7	2	7	1
14	PMPS	2	11	5.5	-4	5.5	-4	3	4	7	-10	1	14	4	-1
	MMPALT	3	6	4	5	2	8	1	9	5.5	3	5.5	3	7	2
15	PMPS	6	-11	5	-6	4	-2	2	9	3	4	1	14	7	-17
	MMPALT	4.5	2	6.5	0	4.5	2	2	4	1	5	3	3	6.5	0
16	PMPS	6	1	3.5	7	2	9	5	5	3	21	3.5	7	7	-32
	MMPALT	4.5	1	2	4	4.5	1	1	5	6.5	0	3	2	6.5	0
17	PMPS	4	7	5	-3	1	17	2.5	11	6	-9	2.5	11	7	-36
	MMPALT	4	4	2.5	6	2.5	6	1	10	5.5	3	5.5	3	7	0
18	PMPS	4.5	-2	3	2	1.5	4	1.5	4	6	-4	4.5	-2	7	-18
	MMPALT	7	0	1.5	5	5	2	1.5	5	3	4	5	2	5	2

Subject Number	Instrument	ELEMENTS Print Rank	Print Score	Aural Rank	Aural Score	Interactive Rank	Interactive Score	Visual Rank	Visual Score	Haptic Rank	Haptic Score	Kinesthetic Rank	Kinesthetic Score	Olfactory Rank	Olfactory Score
19	PMPS	2	9	3	8	4	2	1	19	5	-8	6	-21	7	-23
	MMPALT	5	4	3	7	2	9	1	10	5	4	7	1	5	4
20	PMPS	6	-8	7	-10	5	-5	4	-4	2	16	1	18	3	4
	MMPALT	4	2	6	1	6	1	1	5	2.5	3	2.5	3	6	1
21	PMPS	1	21	2	9	6	-5	3	5	4	3	5	-3	7	-33
	MMPALT	5	3	3	5	7	0	1.5	7	1.5	7	4	4	6	2
22	PMPS	5	-8	4	-6	6	-25	7	-30	1	24	2.5	12	2.5	12
	MMPALT	6.5	0	6.5	0	3.5	2	3.5	2	3.5	2	3.5	2	5	1
23	PMPS	3	5	4.5	-2	4.5	-2	2	12	6	-6	1	18	7	-21
	MMPALT	5	2	2	4	3.5	3	1	6	3.5	3	6	1	7	0
24	PMPS	1	19	2	11	5	-4	3	7	6	-9	4	6	7	-32
	MMPALT	6.5	0	4.5	3	2	6	1	7	4.5	3	3	4	6.5	0
25	PMPS	1.5	14	4	0	3	4	1.5	14	5	-9	6	-14	7	-27
	MMPALT	2	5	5.5	1	3.5	3	1	9	3.5	3	5.5	1	7	0
26	PMPS	1	14	2	10	3	4	4	2	5	-10	6	-14	7	-16
	MMPALT	5	5	5	5	2	6	1	8	5	5	6	3	7	2
27	PMPS	4	9	3	10	2	14	5	-5	6	-14	1	19	7	-30
	MMPALT	3	4	4.5	3	1	7	2	5	4.5	3	6.5	0	6.5	0

Subject Number	Instrument	ELEMENTS Print Rank	Print Score	Aural Rank	Aural Score	Interactive Rank	Interactive Score	Visual Rank	Visual Score	Haptic Rank	Haptic Score	Kinesthetic Rank	Kinesthetic Score	Olfactory Rank	Olfactory Score
28	PMPS	3	9	4	4	1	31	2	14	5	-2	6	-10	7	-32
	MMPALT	5	1	3	4	1	8	2	5	4	3	6.5	0	6.5	0
29	PMPS	6	-14	1	29	2	7	5	-8	4	0	3	6	7	-29
	MMPALT	3	5	5	3	1	7	2	6	6	2	4	4	7	1
30	PMPS	5	1	1	10	3	3	4	2	2	4	6	-17	7	-22
	MMPALT	7	1	5.5	2	1	10	2	7	4	5	3	6	5.5	2
31	PMPS	5	-4	6	-10	3	4	4	0	2	10	1	18	7	-18
	MMPALT	5	3	2.5	6	2.5	6	1	7	5	3	5	3	7	0
32	PMPS	4.5	0	3	1	1	7	6	-3	7	-7	2	6	4.5	0
	MMPALT	4.5	4	2	6	4.5	4	1	7	6	3	3	5	7	2
33	PMPS	2	17	1	18	3	13	6	-1	5	1	4	5	7	-28
	MMPALT	3	3	6.5	1	1	5	5	2	3	3	3	3	6.5	1
34	PMPS	1	23	4	0	2	14	3	4	6	-14	5	-4	7	-23
	MMPALT	5	4	2	7	6	3	1	9	3.5	6	3.5	6	7	2
35	PMPS	4	0	3	8	1	14	2	12	5	-6	6	10	7	-14
	MMPALT	5.5	4	5.5	4	2.5	6	1	7	2.5	6	4	5	7	3
36	PMPS	5.5	-8	5.5	-8	2	18	4	-1	3	9	1	21	7	-28
	MMPALT	6.5	1	4	5	2	6	1	8	4	5	4	5	6.5	1

Subject Number	Instrument	ELEMENTS Print Rank	Print Score	Aural Rank	Aural Score	Interactive Rank	Interactive Score	Visual Rank	Visual Score	Haptic Rank	Haptic Score	Kinesthetic Rank	Kinesthetic Score	Olfactory Rank	Olfactory Score
37	PMPS	5	-5	3	4	4	2	7	-20	1	19	2	9	6	-7
	MMPALT	4.5	1	6.5	0	1	3	2.5	2	4.5	1	2.5	2	6.5	0
38	PMPS	6	-10	5	-2	3.5	6	2	8	3.5	6	1	16	7	-18
	MMPALT	7	1	4.5	4	1.5	6	4.5	4	1.5	6	4.5	4	4.5	4
39	PMPS	4	2	5	-2	2	8	6	-4	3	4	1	16	7	-12
	MMPALT	6.5	1	2	5	1	8	3.5	3	5	2	3.5	3	6.5	1
40	PMPS	5	3	3.5	4	3.5	4	6	-3	1.5	12	1.5	12	7	-12
	MMPALT	7	0	4	1	4	1	1	2	4	1	4	1	4	1
41	PMPS	3	9	6	-9	4	-3	1	19	5	-7	2	13	7	-31
	MMPALT	5.5	1	1.5	4	5.5	1	4	2	4	1.5	3	3	7	0
42	PMPS	5	-5	4	-1	6	-12	3	8	2	13	1	26	7	-21
	MMPALT	7	2	2	7	5.5	4	3	6	1	8	5.5	4	4	5
43	PMPS	6	-18	5	-7	2	20	3	10	4	4	1	24	7	-33
	MMPALT	5	5	3	7	4	6	1	7	2	7	6	3	7	2
44	PMPS	6	-11	5	-6	3	4	4	2	2	12	1	18	7	-21
	MMPALT	4.5	6	3	7	7	4	2	8	4.5	6	6	3	1	10
45	PMPS	4	0	5	-4	2	10	6	-6	3	4	1	18	7	-18
	MMPALT	5	4	5	4	2.5	7	1	8	2.5	7	5	4	7	1

VITA

Walter Lucas, Jr.

Candidate for the Degree of

Doctor of Education

Thesis: A STUDY OF THE PERCEPTUAL LEARNING STYLE OF ADULTS AGE 40 TO 60

Major Field: Occupational and Adult Education

Biographical:

Personal Data: Born in Clanton, Alabama, September 1, 1933, the son of Mrs. Lillie Cleckler Lucas and the late Mr. Walter Lucas. Married to the former Nina Lee Moore of Burden, Kansas, October 10, 1952. They have two daughters, Rebecca Lynn Rollins and Lorrena Ann Lucas and one son, Kenneth Allen Lucas.

Education: Received a Bachelor of Science degree in Business Administration from the University of South Carolina in 1972; completed one year of graduate work in Education and Teaching at Middle Tennessee State University in 1973-1974; received Master of Political Science degree from Appalachian State University, Boone, North Carolina in 1977; completed requirements for the Doctor of Education at Oklahoma State University in May, 1985.

Professional Experience: Teacher, Hixson High School, Hixson, Tennessee, 1973-1974; Instructor, Jones College, Orlando, Florida, 1981; Instructor, Federal Aviation Administration Academy, Oklahoma City, Oklahoma, 1982-1983.

Professional Organizations: Member, American Association for Adult and Continuing Education; Member, Phi Delta Kappa Honor Society.