INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

UMI

A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor MI 48106-1346 USA
313/761-4700   800/521-0600

An Assessment of the Preferred Learning Styles of Undergraduates Enrolled in a Core

Curriculum Introductory Health Course

Jeffrey Anthony Bonacci

A dissertation presented to the
Graduate Faculty of Middle Tennessee State University
in partial fulfillment of the requirements
for the degree Doctor of Arts
August, 1998

An Assessment of the Preferred Learning Styles of Undergraduates Enrolled in a Core

Curriculum Introductory Health Course

Jeffrey Anthony Bonacci

Approved:

J. Douglas Winbourn
Major Professor

James O. Hoffman
Committee Member

William R. Whitlow
Committee Member

Anita T. Patterson
Chair, Department of Health, Physical Education, Recreation and Safety

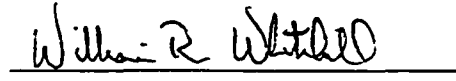_Darrell L. Curry_
Dean, College of Graduate Studies

ABSTRACT

An Assessment of the Preferred Learning Styles of Undergraduates Enrolled in a Core

Curriculum Introductory Health Course

Jeffrey Anthony Bonacci
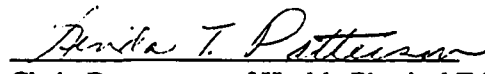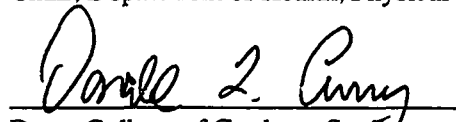
Several post secondary universities require undergraduates to earn a certain

number of credit hours in core curriculum courses in physical education . However, the

preferred learning styles of students enrolled in these courses is unknown. Thus, in order

to better assist the college instructors, this study assessed the preferred learning styles of

undergraduates enrolled in a physical education core curriculum course. Subjects

consisted of 603 undergraduate students enrolled in a introductory health course. All

subjects' preferred learning styles (visual, auditory, bodily-kinesthetic, individual and

group learner, oral and written expressive learner, sequential and global learner) were

measured using the Computerized Assessment and Prescription Styles of Learning

(CAPSOL) ® learning style inventory. The results of the study showed that the students

use more than one preferred learning style. The three most preferred learning styles were

visual (60.4%), individual (57.7%) and bodily kinesthetic (39.0%). Learning styles were

also recorded for gender, academic major, age range, and academic standing.

Recommendations were provided for teaching strategies to reinforce the preferred learning

styles and for future studies of preferred learning style of students enrolled in core

curriculum physical education courses.

ACKNOWLEDGMENTS

I would like to take this opportunity to express my sincere gratitude to the individuals who have played an important role in the pursuit of my doctoral degree.

First, and most importantly, I must thank my major professor, Dr. Douglas Winborn. Your patience and guidance throughout my doctoral program I will remember forever. I will never forget you.

Second, I never could have completed my doctoral education without the help of Dr. William Whitehill, my committee member and curriculum director of athletic training. You took a chance and offered me a graduate assistantship which enabled me to further my endeavors as an athletic training educator. You allowed me to model in your footsteps as a future member of the professoriate. The invaluable opportunities and experience that you allotted me I will carry with me forever.

Third, Dr. James Huffman offered valuable suggestions for my dissertation which will assist me in future academic writing. I thank you.

Fourth, I would like Dr. Jack D. Arters professor emeritus of educational leadership and Dr. A. H. Solomon professor, health, physical education and recreation and safety. You both have provided an excellent model to follow in the classroom. Your standards and philosophy have shaped my own teaching style.

Fifth, I can not thank enough for the endless love and support of my parents, Anthony and Janet Bonacci. I could have not been as successful without the instilled values you bestowed onto me. I thank you.

Lastly, my soul mate and best friend, my wife Theresa. It would not have been possible to consider a doctoral degree without your love and support.

i

TABLE OF CONTENTS

iii

TABLES

FIGURES

APPENDICES

vi

CHAPTER I

INTRODUCTION

A concern for learning can be dated back to biblical record when Moses stressed how the Israelites should instill the Commandments and Laws of the Mosaic Code. Moses is cited in the book of Deuteronomy in the Old Testament Chapter 6, Verse 4 carrying out this command:

> Hear, O Israel: The Lord our God, the Lord is one. Love the Lord
> your God with all your heart and with all your heart and soul and with
> all your strength. These commandments that I give you today are to be
> on your hearts. Impress them on your children. Talk about them when
> you sit at home and when walk along the road, when you lie down and
> when you get up. Tie them as symbols on your hands and bind them on
> your foreheads. Write them on the door frames of your houses and on
> your gates (Palmer, The NIV Study Bible, *New International Version*, 1985,
> p. 254).

Since Moses suggested the different methods to teach the laws of the Mosaic Code to the children of Israel, educators have suggested numerous ways to effectively disseminate information to students. Most individuals have an innate method of obtaining knowledge. Methods employed by individuals for the purpose of obtaining knowledge are referred to as learning style. De Bello (1990) provided a general definition of learning style as the "way people, absorb, process and retain information" (p. 203). This process may occur through reading, listening, or through life experiences. Some individuals may learn best individually while others learn best working in groups.

Different types of learning styles have been labeled by several educational researchers. Henderson and Conrath (1991) identify nine different learning styles as visual, auditory, bodily-kinesthetic, individual learner, group learner, oral expressive learner, written expressive learner, sequential learner, and global learner. According to

Henderson and Conrath (1991), these nine styles of learning are widely accepted and understood learning styles in the educational teaching method literature. Visual, auditory, and bodily-kinesthetic learning styles are referred to as the sensory learning styles (Henderson & Conrath, 1991). Learners utilize innate senses (sight, hearing, and touch) to reinforce the sensory learning styles. The remaining six learning styles (individual learner, group learner, oral expressive learner, written expressive learner, sequential learner, and global learner) are different learning methods of how students process and express information that is learned.

Learning styles have been studied at primary, secondary, and collegiate levels. Such studies have shown that when college students are given the opportunity to use their preferred learning style, success in understanding the subject matter is enhanced. Dunn, Deckinger, Withers, and Katzenstein (1990) issued a homework prescription based on their preferred learning style to 200 college marketing students. Results of their study revealed that marginal and underachieving students' achievement on exams statistically improved by 30% compared to a control group that did not receive the homework prescription. Nelson, Dunn, Griggs, Primavera, Fitzpatrick, Bacilious, and Miller (1993) conducted a study to assess how learning style intervention on college students can improve their retention and achievement. The sample of this study comprised of the 1,089 college freshman that were issued a preferred learning style profile and were assigned to three groups that differed in intensity of learning. They found the highest intensity group achieved a significantly higher grade point average than subjects who were classified in medium and lower intensity groups. Lenehan, Dunn, Ingham, Singer, and Murray (1994)

investigated how test anxiety would decrease once students were given a homework prescription based on their preferred learning style. The results showed that the experimental group of 125 pre-nursing students in an anatomy and physiology course had a significant reduction in test anxiety on the Speilberger Stait - Trait Anxiety Inventory than the control group that did not receive a homework prescription.

Learning style research has been conducted at the college level from a variety of academic disciplines ranging from the liberal arts to professional fields to allied health. One purpose for such research was to assist college teachers of particular academic disciplines in identifying the dominant learning style. Once the style is identified, content may be disseminated in an effective manner that will most effectively foster learning and academic success (Dunn & Dunn, 1978). However, no studies in post secondary student learning style research has been directed toward undergraduates enrolled in core curriculum courses for physical education. Therefore, the present results from learning style studies may not provide the information to college academicians who teach required undergraduate core curriculum courses in health and education.

At various post-secondary institutions, undergraduates are required to achieve a certain number of academic credit hours in physical education ranging from activity courses to first aid to general health courses. The academic majors of students who enroll in physical education core curriculum courses major in different academic disciplines such as the basic sciences to education to allied health to pre-professional programs to the humanities. With such diversity of academic majors in physical education core curriculum courses, it is difficult to label a specific learning style trend of these students.

Problem Statement

College instructors may implement a teaching strategy that is most conducive to their own learning style. Therefore, by not teaching to the strength of the students preferred learning style, the teacher is not meeting the instructional needs of the student, thus detracting from the student's ability to understand and retain information presented in class. Therefore, in order to better assist college instructors of physical education core curriculum courses, this study showed the several preferred learning styles of the undergraduates who enrolled in a physical education core curriculum introductory Effective Living Health course.

Significance of the Problem

College instructors who teach health and physical education core curriculum courses encounter students from a variety of different academic majors. Students from different academic programs can portray a variety of preferred learning styles creating problems for the teacher to convey information effectively. Therefore, describing the preferred learning styles (visual, auditory, bodily, kinesthetic, individual learner, group learner, oral expressive, written expressive, and sequential learner) of different academic colleges will provide invaluable information about how students learn best to college graduate teaching assistants, instructors, and faculty who teach Effective Living Health courses at Middle Tennessee State University (MTSU). The Effective Living Health course is a general health course designed for students to deal more effectively with

personal and family health responsibilities as well as emergency situations (MTSU - Admissions Department. 1995). Once the teacher has assessed the preferred learning style of the student, they can structure their teaching strategies accordingly to better foster student learning.

Research Questions

1. What was the overall percentage scores of "high and low preference" of learning style (visual, auditory, bodily, kinesthetic, individual learner, group learner, oral expressive, written expressive, sequential, and global learner) of undergraduates that enrolled in Effective Living Health courses at MTSU during the spring semester 1998?

2. What academic standing (freshman, sophomore, junior, senior, more than four years of college) exhibited the largest sampling of "high preference" percentage score of learning style (visual, auditory, bodily, kinesthetic, individual learner, group learner, oral expressive, written expressive, sequential, and global learner) of undergraduates that enrolled in Effective Living Health courses at MTSU during the spring semester 1998?

3. What age range exhibited the largest sampling of "high preference" percentage score of learning styles (visual, auditory, bodily, kinesthetic, individual learner, group learner, oral expressive, written expressive, sequential, and global learner) of undergraduates that enrolled in Effective Living Health courses at MTSU during the spring semester 1998?

4.   Which gender exhibited the largest sampling of "high preference" percentage score of learning styles (visual, auditory, bodily, kinesthetic, individual learner, group learner, oral expressive, written expressive, sequential, and global learner) of undergraduates that enrolled in Effective Living Health courses at MTSU during the spring semester 1998?

5.   What academic college demonstrated the largest sampling of "high preference" percentage score of learning styles (visual, auditory, bodily-kinesthetic, individual and group learner, oral expressive, written expressive, sequential, and global preferred learning style) of undergraduates enrolled in an Effective Living Health course at MTSU during the spring semester 1998?

Definition of Terms

Terms relevant to this study are defined below:

1.   Effective Living Health course -- A general health course which is one of many selected options of physical education core curriculum course requirements offered at MTSU. Students at MTSU are required to take four credit hours of physical education as a part of their general education requirement.

2.   Middle Tennessee State University (MTSU) -- A large (18,000 students) regional postsecondary institution in Murfreesboro, Tennessee.

3.   Computerized Assessment and Prescription Styles of Learning -- (CAPSOL) ® --

A comprehensive instrument that will identify a student's style of learning. The

CAPSOL® assesses nine modes of learning (visual, auditory, bodily-kinesthetic, individual

learner, group learner, oral expressive, written expressive, sequential, and global).

4.   Visual Learner -- This mode of learning describes perceiving by seeing words and

numbers in a book, on a chalkboard, on charts, or in workbooks (Henderson & Conrath,

1991)

5.   Auditory Language Learner -- This mode of learning describes perceiving by

hearing words or numbers (Henderson & Conrath, 1991).

6.   Bodily-kinesthetic Learner -- This mode of learning describes perceiving by

experience and self involvement. There is a combination of stimuli involved with the

manipulation of material along with accompanying sight and sounds (Henderson &

Conrath, 1991).

7.   Individual Learner -- This mode of learning describes how students who prefer to

work alone learn best. These students think best and remember more when they are alone.

They believe they are more confident with their own opinions (Henderson & Conrath,

1991).

8. Group Learner -- This mode of learning describes how students strive to learn or study with at least one other student. They value the opinions of others and preferences and group interaction increases their learning and enhances the recall of facts. Class observation will reveal how important socializing is to this type of learner (Henderson & Conrath, 1991).

9. Oral Expressive Learner -- This mode of learning describes the students who can easily discuss what they know. They talk fluently, comfortably and seem to be able to convey meaning precisely. Oral responses may reveal a degree of knowledge greater than their written test indicate (Henderson & Conrath, 1991).

10. Written Expressive -- This mode of learning describes the students who can write fluent essays and proficient answers on tests to demonstrate their knowledge. Their thoughts are better organized on paper than when they are presented orally (Henderson & Conrath, 1991).

11. Sequential Learner -- This mode of learning describes the students ability to arrange thoughts and ideas in a very linear fashion. These students like neatness, order, and have everything in place (Henderson & Conrath, 1991).

12. Global Learner -- This mode of learning describes the students' ability to be fluid and spontaneous. These students are quiet, intuitive and order thoughts and ideas

randomly. Students displaying this mode of learning style like to create their own way of doing things (Henderson & Conrath, 1991).

<div style="text-align: center">Assumptions of the Study</div>

1.   CAPSOL® -- Construct validity of the CAPSOL® was established through factor analysis. Responses to the 45 items of the CAPSOL® by five hundred students were factor analyzed using orthogonal rotation (VARIMAX) in order to identify commonalties among the items. The arbitrary criteria for an item to represent a factor was a factor loading of .40. Any item below .40 was modified or replaced until all of the items met the criteria (Henderson & Conrath, 1991).

Content validity of the CAPSOL® was established through experts in learning style research. The experts were comprised of five school administrators with terminal degrees well versed in learning style research, five classroom teachers who have at least ten years of experience with learning style research, and five post-doctoral students researching learning styles. The experts agreed that all the items were valid measurements of the nine learning style modes (M. Conrath, personal communication, October 15, 1997).

Reliability of the CAPSOL® was determined by administering the instrument to 91 college students in a test-retest situation. A one-way analysis of variance reliability coefficient was used at $p < .05$ to determine mean differences between measuring sessions. There were no significant differences among the learning style subscales between the two

test adiministrations. The reliability coefficients of the test-retest ranged from 0.63 to

0.81. The mean reliability coefficient for the 45 items was 0.66 (Bonacci & Renaud,

1998).

Internal consistency reliability was determined from a two-way analysis of variance

Cronbach's alpha model of 116 college students for the five subscales on the CAPSOL®

instrument. The intra-class correlation coefficients ranged from 0.44 to 0.88. The mean

reliability coefficient for the 45 items was 0.65 (Bonacci & Renaud, 1998).

2.   Students were candid and impartial with their responses on the CAPSOL®

learning style preference questionnaire.

Limitations

1.   The responses were limited to undergraduate students who enrolled in Effective

Living Health courses at MTSU during the spring semester 1998.

2.   The undergraduates enrolled in the Effective Living Health course will not know

their preferred learning style.

Chapter II

Review of Literature

Introduction

The review of related literature will present a historical perspective that delineates

the evolution of learning of theories from ancient Greeks to John Lock to the American

learning theorists Thorndike, Hull, and Skinner to contemporary learning specialist

William Glasser. Style, as it pertains to learning, will show how educational researchers

examined the relationships among style and personality and learning. Several theoretical

and conceptual backgrounds of learning style models will be provided. Learning style

models of Keefe, Hill, Schmeck, Kolb, Dunn & Dunn, Price, and Henderson & Conrath

are presented. The specific theoretical basis for the CAPSOL® learning style instrument

which provided the measurement instrument for this study will be reviewed. The research

questions addressed in this study will be individually linked with supportive literature

findings.

<u>Learning</u>

Many authors have provided various definitions of learning. Therefore, framing an

exact definition of learning is rather difficult. However, collectively, educational

researchers have stated that to some extent learning is obtained and developed through

life's experiences. Bower and Hilgard (1981) provided this definition of learning:

> Learning refers to the change in a subject's behavior or behavior
> potential to a given situation brought about by the subject's repeated
> experiences in that situation, provided that the behavior change cannot
> be explained on the basis of the subject's native response tendencies,
> maturation, or temporary states (such as fatigue, drunkenness, drives, and

so on) (p.22).

Learning can be traced back to the ancient Greeks and Romans who developed ideas about learning that have influenced educators for centuries. Aristotle's mnemonic techniques of association and visual imagery are still in use today. Hippocrates' classifications of temperaments into sanguine, choleric, melancholic, and phlegmatic foreshadowed much of the work on personality types done during the past 50 years (Cornett, 1983).

During the seventeenth century John Locke, with his concept of "tabula rasa" (blank slate), explained that "we place on this slate only what comes through our experiences.... [He realized that] through experience individuals use their five senses to learn, but how this happened was left to conjecture" (Henson & Borthwick, 1984, p. 4) . In the late nineteenth century, Charles W. Eliot president of Harvard University called for individualization of instructors to truly liberalize the college curriculum, thus echoing Pestalozzi, Rousseau, Comenius, and other educators who had recognized the need to examine and develop the uniqueness of each person (Cornett, 1983).

Several learning theorists have postulated theories of how people learn. E. L. Thorndike, regarded as the father of instrumental learning, formalized his theory of *Connectionism* (an association between sense impressions and impulses to action responses) (Bower & Hilgard 1981).

Thorndike experimented with animals to better understand the process of learning. In these endeavors he developed more theories and laws of learning which led to the formation of the *Law of Effect*. Schmidt (1991) explained Thorndike's:

Law of Effect as an action elicited by a stimulus and followed by pleasant, or rewarding consequences tends to be repeated when that stimulus appears again; an action followed by unpleasant, or punishing, consequences tends not to be repeated (p.234).

He believed that if enough pleasant responses or rewards occurred from the action, subsequent actions of the same task occur automatically, which for Thorndike meant the response had been learned.

As Thorndike further studied learning with animals, he noticed the animals displayed an anticipated behavior following a pleasant stimulus. He referred this type behavior as the *Law of Readiness* which is the satisfaction or annoyance that depends upon the state of the behaving organism. Thorndike explained the Law of Readiness through hypothetical neural units. When a conduction of neurons is ready, the conduction is satisfying. When a conduction unit is unready, then conduction is annoying. When the conduction unit is ready and no conduction occurs, then the organism is frustrated or is annoyed (Swenson, 1980).

Learning theorist Clark L. Hull, unlike Thorndike, devoted most of his research to how animals learn. Hull viewed learning as a means for organisms to adapt to their environment in order to survive (Swenson, 1980). Hulls' theory was designed to show how organisms' bodily needs (drives) interacted with the environment. Hull believed the assumption that there are some inborn tendencies that respond in specific ways to drive states of learning. However, his theory is strongly biased towards seeing learning as a result of environmental influences rather than innate factors (Swenson, 1980).

Hull believed that learning could not occur without reinforcement which must

arise from an external source (i.e. reward for answering correctly or verbal praise or motivation). Hull theorized that as the number of reinforced trials increased, the *habit strength* (the ability to reproduce the task correctly) of the task increased. However, Hull further speculated that over-reinforcement following trials of task reduced the *Stimulus-Response* (SR) bond or decreased the *habit strength* thus reducing the drive to the take the task to a higher level (Swenson, 1980).

Burrhus Frederic Skinner believed in the true scientific method of determining the learning process. Furthermore, he thought the ultimate cause of inner behavior could be traced to environmental influences (Swenson, 1980). Skinner's overall goal was to develop a method of analyzing the function of environmental events in determining and predicting the behavior of animals and humans. The method that he developed was referred to as the causal or functional analysis which investigated the external variables controlling behavior. Based on Skinner's method of behavioral analysis, the laws of behavior are the cause and effect relationship between the learner's dependent variable (external events) and the learner response (independent variable). Through the analysis he wanted to predict and control the dependent (behavioral) variable. Skinner hypothesized that he could predict the learners response by shaping the behavior of learner when supplying reinforcement in a systematic fashion.

In order to control behavior, Skinner believed that reinforcement should be provided immediately in a scheduled fashion following the desired action. Moreover, Skinner believed that systematically scheduling the rewards would influence the frequency of the responses. Skinner established his beliefs with pigeons, among other animals,

through the use of his famous Skinner Box. When the animal was hungry (normal behavior) it would push a metal plate (learner response) in the box and the food would be distributed to the animal (reward/reinforcement). Through this process, Skinner was able to acquire the desired behavior desired by the animals. Eventually, he applied this reinforcement/reward model to human learning as a method of acquiring the hypothesized behavior (Swenson, 1980).

Skinner believed that behavior could be shaped in almost any fashion by supplying reinforcement in a systematic pattern. However, Skinner stated that in order for human behavior control to be effective, it is essential to make a fundamental assumption about human nature that conflicted with the view of free will. Humans are still going to have the free will to do what they want, no matter how well a scientist planned to control human behavior (free choice) (Swenson, 1980).

As a learning researcher, Skinner believed it was more sensible to concentrate on the environmental experiences that can be arranged and altered to achieve the hypothesized behavior. Skinner defined this method/process as behavior modification (the investigator decides on what specific types of behavior to encourage and discourage) (Swenson, 1980).

More contemporary learning theorists have postulated other theories. Cognitive processing emerged as the dominant theory from the late 1970's to the mid 1980's as a result of Piaget's *Cognitive Development Model* (Neuhoff, 1998). Piaget's *Cognitive Developmental Model* was structured around specific stages of how the child begins and progresses to learn. The first stage, sensorimotor, was defined by Piaget "as when

children deal directly with the environment by utilizing their innate reflexes; the second stage, preoperational, where children begin rudimentary concept formation; the third stage, concrete operations, where children use interiorized actions or thought to solve problems in their immediate experience; and the fourth stage, formal operations, where children can ponder completely hypothetical situations" (Hergenhahn, 1988 p. 284).

From Piaget's model of learning, cognitive processing was coined as a process of thinking. Piaget's developmental theory embraced a perspective of cognitive processing with a concentration on cognitive development as a natural process (Ebert, 1994). In addition, Ebert (1994) synthesized a definition of cognitive processing from Piaget's learning model as "the cognitive search for patterns, relationships, and perspectives between what is known by an individual, and the stimulus (whether internally or externally generated) which is perceived" (p. 1). Ebert (1994), however, believed that effective cognitive processing could not occur if the learner did not possess the ability to think creatively. "Creative thinking is not confined to works of art, or novel or ill-defined problems. Instead, learners who engage in such thinking find patterns, relationships, and perspectives between a stimulus and the knowledge base and then deduce inferences to support hypothesized theories" (Ebert, 1994, p. 277).

Ebert (1994) developed a learning paradigm, *Cognitive Spiral Model,* consisting of five components arranged in a spiraling continuum rather than a cyclic arrangement: (a) *Perceptual Thought,* (b) *Creative Thought,* (c) *Inventive Thought,* (d) *Metacognitive Thought,* and (e) *Performance Thought.* Ebert (1994) described how each stage relates to the scope of cognitive processing. *Perceptual Thought* is the detection of a stimulus

through innate sensory organs. During this stage, the learner is not evaluating processes in which judgments are compiled with regard to the efficacy, validity or content of the stimulus. Instead, learners utilize the sensory organs to make perceptions of the immediate environment in which they are learning. Next in the *Creative Thought* phase, the initial stimulus is compared with the learners knowledge base from previous experiences. This process is weighed as a cognitive search in which the learner mentally gathers patterns, perspectives, and relationships between what has been presented as the stimulus. However, (Ebert, 1994) stated that the "search is not an evaluative process establishing 'correctness' as in an academic sense, but a further accumulation of information to further develop the creative thinking process. As the instructional process progresses, learners increase their ability to think creatively for future stimuli" (p. 278).

Then begins the *Inventive Thought* stage, in which the learner begins to assemble possible products from the gathered information. At this point in the *Cognitive Spiral Model*, divergent thinking is de-emphasized and convergent thinking is initiated. According to Ebert (1994), however, the *Inventive Thought* process only prospers given what has been provided during the *Creative Thought* process and deals with the possible arrangements from the materials thus provided. Once *Inventive Thought* has constructed the product, the *Metacognitive Thought* process exerts a pre-performance evaluation of the possible solution. The newly conformed evaluation may take the form of determining whether the product is a conceivable solution to the problem. Ebert (1994) suggested, that it is at this point the new derived criteria is applied to the potential product. Ebert referred to this process as "thinking about one's thinking."

Metacognitive Thought determines whether the product fulfills the criteria of the problem. No matter what the determination the *Metacognitive Thought* reaches, a decision to accept or decline the solution will occur only if the decision leads to the appropriate expression or performance of the cognitive product. However, it is not until the processes of *Performance Thought* that the determination made in *Metacogntive Thought* can be validated as the appropriate expression. Ebert (1994) believes that once the solution is validated the information is stored in the learner's long term memory which can be called upon immediately or at any particular moment. Most significantly in terms of the Cognitive Spiral Model, is the option of selecting the product as a cognitive perception again in the future. When a new stimulus is presented to the learner, the stored cognitive is used as a new stimulus which starts another spiral of processing.

Educational researcher Beverly Rosenshine (1995) studied *Cognitive Processing* of students in the classroom. Rosenshine stated in order for students to possess strong cognitive processing abilities, "well-connected and elaborate knowledge structures are essential because it allows [sic] for easier retrieval of old material, permits more information to be carried in a single chunk, and facilitates the understanding and integration of new information" (p. 262). As for instructors, Rosenshine suggested they should help students develop background knowledge and develop their understanding on the importance of processing and organizing the information. Rosenshine (1995) maintained in order to increase the students' background knowledge, the instructor should provide extensive reading and review, practice, and discuss the knowledge. These activities help the learner to increase the number and organize more pieces of information

that are in the long-term memory and increase the strength and number of interconnections between the pieces of information. Therefore, Rosenshine (1995) believes to increase the student's opportunity for cognitive processing substantiates the necessity for instructors to initiate activities that require students to process and apply new information. In addition, organizing and summarizing information or comparing new material with prior material, all activities that require processing, should promote and reinforce the students' cognitive structures. Specific activities can assist the student to promote the cognitive process. Such an activity includes extensive reading of a variety of material, explaining the newly acquired information to someone else, writing and answering questions, developing knowledge maps, writing daily summaries, applying the ideas to a new situation, and comparing and contrasting the new material to other material (Rosenshine, 1995).

In order to strengthen the students' ability to organize their knowledge, the instructor must understand that new information presented to students is organized into knowledge structures. Without these structures, new knowledge tends to be fragmented and not readily available for recall and use. However, when students are learning new material, they frequently lack the necessary knowledge structures. Without direction, students might develop a fragmented, incomplete, or inaccurate knowledge structure (Rosenshine, 1995). According to Rosenshine's (1995) research, it is important for instructors to help students organize the new material. She suggests providing students with "graphic organizers," that is, arranging structures for material given by the teacher. An example of an organizer is an outline or concept maps. These structures help students

organize the elements of new learning. Such learned organization methods can enable the student to devote more working memory to content.

Another approach that will assist students with organizing their knowledge is to teach them how to develop their own graphic organizers for new material. The instructor could model the process and also provide models of thinking as the student constructs the map (Rosenshine, 1995).

Another contemporary learning theorist, Dr. William Glasser, MD, has spent the majority of his professional life studying concepts of *Quality Schools*, a theory in which each school is responsible for its own outcomes and how the institution impacts the students lives. Glasser has developed learning theories and techniques that have assisted administrators in how to manage schools, and instructors effectively manage learners in the classroom. Glasser is best known for his world renowned book <u>Reality Therapy</u>, a method of psychotherapy that can be applied to all human problems. Early in Glasser's career, he became interested in prevention of diseases in mental health which led to his works in public schools. His premise was that school failure was very destructive to the mental health of the failing student. Midway in his career, Dr. Glasser became involved with a new theory of how human beings function, that is *Control Theory*. Dr. Glasser emphasizes the importance of having a sound knowledge of *Control Theory* if educators are to make meaningful changes not only in schools, but in all other institutions that impact on human lives (Glasser, 1998a).

The concept of *Control Theory* was developed in the mid 1960s. Glasser provided a description of his theory: He wrote:

The *Control Theory* is a biological theory which explains both the psychological and physiological behavior of all living creatures and contends that all human beings are born with five basic needs built into their genetic structure: survival, love, power, fun, and freedom.... *Control Theory* is a descriptive term because we try to control our own behavior so that what we choose to do is the most need-satisfying thing we can do at the time. Therefore, *Control Theory* is defined as the explanation of this constant attempt to control both ourselves and others even though in practice we can control only ourselves.... Glasser further states that "control" in this context means to control as in steering a car or following a recipe. It does not mean to dominate by using force or the threat of force, as a police officer does to subdue a criminal (Glasser, 1990 p. 44).

Believing the control theory can be implemented in the classroom when trying to

manage student learning; Glasser presented an ideal example:

For those in the position of managing people, knowledge of needs is more than helpful, it is essential. For example, when I present my ideas to teachers and administrators, I usually interview six or seven senior high school students in front of a large audience. Because for young people the need for power is very difficult to satisfy, I always ask, "Where in school do you feel important?" This question always seems to the students to come from outer space; they look at me as if I had asked something ridiculous. Even for the very good students, who are the group usually selected to be interviewed, feeling important (powerful) in school is an experience that few seem to think relates to them.
     However, when I persist, most students tell me that they feel important in their extracurricular activities: Sports, music, and drama are most frequently mentioned. Almost never mentioned are academic classes. When asked why this is so, they say that in the extracurricular situations, where they work together as a group or on a team, they work harder and accomplish more because they help each other and have more fun. They also emphasize that they are both more comfortable and less bored in these situations because it is accepted that they socialize while they work, which is unacceptable in their regular classes. From the standpoint of control theory, these students are saying that it is very hard for them to satisfy their needs in academic classes because most work is done alone and there is little or no class discussion.
     To remedy this situation, I strongly suggest in *Control Theory in the Classroom* that we teach students in cooperative groups in their academic classes. Learning together as a member of a small learning team is much more need satisfying, especially to the needs for power and belonging, than learning individually. Good lead-managers recognize that when they can promote and support worker cooperation,

they have laid the foundation for quality work (Glasser, 1990 p. 48).

As Glasser progressed through his research of the *Control Theory* in the late 1980's he decided to substitute the term *Choice Theory,* since he had adjusted the original theory so much by incorporating the ideas of basic needs and a quality world (Glasser, 1998b).

Choice Theory attempts to explain both the psychological and physiological behavior of all living creatures. It maintains that from birth to death we behave, and that our behavior is internally motivated and chosen. *Choice Theory* is a dramatic departure from the traditional, externally motivated common sense psychology of the world, eternal control psychology. Specifically, all of our behavior is our best attempt to satisfy one or more of the five basic needs built into the human genetic structure. *Choice Theory* claims that the only person's behavior we can control is our own. Glasser contends that this model helps people learn that what they do is not determined by external causes, but instead by what occurs inside each individual. (Glasser, 1998c). According to Glasser, there are ten axioms of the *Choice Theory*:

1. The only person whose behavior we can control is our own.
2. All we can give another person is information
3. All long-lasting psychological problems are relationship problems.
4. The problem relationship is always part of our present life
5. What happened in the past has everything to do with what we are today, but we can only satisfy our basic needs right now and plan to continue satisfying the pictures in our Quality World.
6. We can only satisfy our needs by satisfying the pictures in our Quality World
7. All we do is behave.
8. All behavior is Total Behavior and is made up of four components: acting, thinking, feeling and physiology.
9. All Total Behavior is chosen, but we only have direct control over the acting and thinking components. We can only control our feeling and physiology indirectly through how we choose to act and think.

10. All Total Behavior is designated by verbs and named by the part that is the most recognizable (Glasser, 1998c).

Based on the premise of the *Choice Theory*, Glasser contends that educational administrators and teachers must identify the individual and community needs of the learners at a particular school system. Glasser identifies this process as *Reality Therapy*, a method of counseling which teaches people how to direct their own lives, make more effective choices, and how to develop the strength to handle the stresses and problems of life. The core of *Reality Therapy* is the idea that regardless of what has "happened" in our lives, or what we have done in the past, we can choose behaviors that will help us meet our needs more effectively in the future (Glasser, 1998a).

Style in the Learning Context

Carl Jung, a German psychologist, is perhaps one of the best known investigators in learning behavior. His research "psychological types" first appeared in 1921 (Guild & Gulkus, 1985). It was Jung's psychological research which led to the use of the term style. Guild and Gulkus (1985) stated that style is "an unique aspect of our humanness of how each of us perceives the world, governs how we think, make judgments, and form values about experiences and people and our personal perspective is our window on the world." (p.7).

The word "style" was utilized by American psychologist, Gordon Allport in the 1930's as he examined individual differences. Allport defined style as a consistent pattern appearing in individuals (Guild & Gulkus, 1985). Allport further suggested that many psychologists during the 1930s considered the movement of style connected with

personality. In the late 1940's and 1950's Klein reported that people had preferred ways of meeting reality (Guild & Gulkus, 1985).

Research of individual differences (style) gradually diminished with Tyler (1965) attributing to this decline because "tests of this nature showed little relationship to school success thus the enthusiasm of psychologists for the whole mental test movement was considerably dampened.... and the attempt to measure perceptual differences was abandoned" (p. 212). However, Tyler went on to suggest that:

> There is in both education and psychology the possibility that the world might actually look, sound, and feel differently to different persons, that they might solve problems and form concepts in quite different ways, and that the same stimulating situation might carry different meanings for them was something psychological investigators did not generally take into account (p. 211).

In support of Tyler's position, Carroll (1963) wrote an article titled "A Model of School Learning" which recognized the significance of the teacher's behavior in effecting learner attainment. This article also suggested that a person's IQ does not place heavy limitations on learning as presented by Thorndike (Carroll, 1963). Carroll (1963) further discovered that when a variety of teaching approaches were used and when students were given all the time they needed, the correlation between student aptitude and level of achievement approached zero. The findings of this study indicated that given the needed time and the correct teaching methods, almost any student can learn or master the content given to them. Bloom, Hastings, and Madaus (1971) believed that 95 percent of all high school students have this ability as described by Carroll. This contrasts with the concept of the Bell Curve where only one-third of the students are capable of excellence, one-third of average work, and one third are not capable of mastering the work (Carroll, 1963).

<u>Learning Style and Learning Style Models</u>

Since the 1960's educational researchers have provided many definitions of

learning style models and designed instruments to measure various conditions of learning

styles. De Bello (1990) provided an article that reviewed the efforts of leading

educational researchers of learning styles. According to De Bello "there are as many

definitions of learning styles as there are theorists" (p. 204). However, a profound

definition was provided by Dr. James Keefe, Director of Research of the National

Association of Secondary School Principals (NASSP) Learning Styles Task Force. He

writes, " learning styles are the characteristic cognitive, affective, and psychological

behaviors that serve as relatively stable indicators of how learners perceive, interact with,

and respond to the learning environment" (Keefe & Monk, 1982, p. 27). Nonetheless,

Dunn (1984) postulated learners have four basic learning perceptual channels that allow a

particular learning style to evolve. The four channels are visual learning (reading, studying

charts), auditory (listening to lectures and audiotapes), kinesthetic (experiential learning,

that is, total physical involvement with a learning situation), and tactile learning ("hands-

on" learning, such as building models or doing laboratory experiments). Learning style

models are multidimensional, encompassing cognitive, affective, and psychological

characteristics, and others are limited to a single variable, most frequently from the

cognitive domain. Educational researcher, Dr. Anthony Gregorc (1979), views learning

style as:

> consisting of distinctive behaviors which serve as indicators of how a
> person learns from and adapts to his environment. It also give clues as to
> how a person's mind operates (p. 41).

Several authors have made attempts to categorize learning styles. Fischer and Fischer (1979), who believed most teachers can think of students who illustrate several learning characteristics, outlined ten specific and identifiable learning styles. They write:

- Incremental learner - needs a highly structured approach designed to permit the student to reach a generalization.

- Intuitive learner - unsystematic, sporadic learner who often is unable to explain what has been learned in any organized manner.

- Sensory specialist - relies upon one sense (e.g., visual or auditory) even though all are sufficiently operating.

- Sensory generalist - depends upon all senses

- Emotionally involved - requires an environment both physically and mentally stimulating to cause a high emotional charge.

- Emotionally neutral - requires a low-key atmosphere.

- Explicitly structured - needs clear objectives and organized lesson.

- Open-ended structure - prefers an open-ended rather than highly structured environment.

- Damaged learner - a physically normal student with a damaged self-concept and social skills, and who has negative attitude toward learning.

- Eclectic learner - can alter learning styles to fit the occasion despite having a preference for one or another (p. 235).

Warner (1984) identified learning styles as a process called *Cognitive Mapping*. This process uses an inventory to identify and describe a student's learning style through types of media, teaching style, and environmental factors that are preferred. Hill (1979) proposed a process called *Student Perceiver Interview* to be used to assist in identifying a student's learning style. Even though information pertaining to preferred learning styles

can be elicited anywhere throughout the interview, Hill suggested that specific questions

are designed purposefully to seek out students "best way" of obtaining knowledge. Such

questions are posed during an interview between a teacher and student and fall into three

categories:

> The first category is referred to as situational. Situational questions ask the
> student to react to a particular situation. The second category is referred
> to as observational. Observational questions that [sic] give the interviewee
> an opportunity to reflect on the actions of a third party. The third category
> are [sic] labeled as direct. Direct questions ask students to indicate their
> own personal beliefs, feelings, and ideas (Hill, 1979, p. 69).

In 1990, De Bello (1990) summarized the major works of Keefe, Hill, Schmeck,

Kolb, and Dunn and Dunn. As well, Conrath and Henderson (Henderson & Conrath

1991) are considered as learning style researchers of adult learners. These eight

educational researchers are most profound because they presented a historical perspective

of their theories, have influenced other colleagues with their research, related to

concurrent issues in education concerning learning styles, have presented empirical data to

support their theories on learning styles, and are widely known in educational research.

NASSP: Learning Style Profile Model, Keefe

The National Association of Secondary School Principals (NASSP), developed the

Learning Style Profile (LSP) under the direction of Dr. James Keefe and in conjunction

with the National Leaning Styles Network at St. John's University, Jamacia, New York

(Keefe & Monk, 1982). From this effort emerged a learning style model that encompassed physiological/environmental, cognitive, and affective domains as well as an information processing method. From their efforts, the LSP, a 126 item instrument was created to measure the learning styles of secondary students. The LSP is very similar to the Dunn and Dunn model, which emphasizes that students learn through their strongest learning preference and which is strengthened through their secondary or tertiary style. They then taught how to apply the new information creatively through a home work prescription (De Bello, 1990). Curry (1987), reported that the NASSP's LSP has strong reliability and validity as represented by the variables of the Dunn and Dunn Model. However, the LSPs weakest variables are the attributes on cognitive dimensions.

Hill: Cognitive Style Profile

Joseph Hill (1976), an early theorist of learning styles, defined "learning styles as the unique way in which an individual searches for meaning" (p. 10). Hill believed that this process fell into three categories of (1) theoretical and qualitative symbols; (2) modalities of inference; and (3) cultural determinants. The first category was subdivided into auditory and visual elements; each was further subdivided into linguistic and quantitative symbols. Three additional elements included under the first category elements are empathy, proxemics (varying patterns of physical proximity in human or animal populations, especially their role in social interaction and their effect on behavior, Cayne (1993) New Websters Dictionary and Thesaurus), and proprioceptivity. The second category, modalities of interference, is represented as critical thinking, contrasting and

comparisons, relationships between measures, and hypothesis development, some of which are similar to Bloom's taxonomy. This is a classification that identifies six cognitive skills that instructors should utilize in the classroom and measure on tests. Bloom's system arranges cognitive skills in a hierarchy from simple to complex. At the bottom of the hierarchy, knowledge is the least demanding but serves as the basis for the higher level cognitive skills. Comprehension refers to the understanding, the explanation, or a translation of the learned material. Application is associated with the ability to use learned material in new and concrete situations. Analysis is defined as the ability to break down material into its component parts so that the organizational structure is understood. Synthesis designates the ability to put parts together to form a new whole that was not previously present. At the top of the hierarchy, evaluation suggests the students ability to judge the value of material for a given purpose using definite criteria (Jacobs & Chase, 1992). The third category, cultural determinants, is symbols in one's culture, family, and peers that influence the cognitive patterns in students lives. Hills' instrument is a self reporting test as well as an interview component. Curry (1987), however, reported that Hill's instrument showed no reliability or validity.

Schmeck: Inventory of Learning Processes

Schmeck, Ribich & Ramanaiah's (1977) philosophy was that cognitive and personality studies are useful in researching learning styles, but are not conclusive, and that learning styles as a construct would be more beneficial. They also believed that "learning style is a predisposition on the part of some learners to adopt a particular

learning strategy regardless of the specific demands of the learning task.... Schmeck and others define learning strategy as a pattern of information-processing activities that the individual uses to prepare for a test of memory" (Schmeck et al. 1977, p. 420). Schmeck's position on learning strategies was regarded as an information processing continuum; on one end the learner is "shallow/repetitive and reiterative processor and on the other extreme, deep and elaborate processing.... Shallow processors tend to remember the symbols used in communication. As depth of processing increases, the number of conceptual associations increases, giving the material more meaning" (Schmeck et al. 1977, p. 422). Schmeck further believes that elaborate processors do more than just remember; they classify, compare, contrast, analyze and synthesize information.

Schmeck's' instrument, Inventory of Learning Processes, a 62 item true false format, was arranged into four scales. The four scales are synthesis analysis, study methods, fact retention, and elaborate processing. Schmeck's research and instrument, which was geared to the college student, determined that students could retain facts whether one processes them in depth or superficially. However, his findings further showed that college students who retained facts by processing deeply and adhered to facts achieved higher academic success than those who processed shallowly and adhered less to facts. It was later determined that shallow processors were memorizing, merely retaining information verbatim with limited understanding. In her psychometric analysis, Curry (1987) reported the Learning Process Inventory has strong reliability and strong validity.

<u>Kolb: Learning Style Inventory</u>

Kolbs's (1984; 1981), learning style model and instrument, which was designed for and has been applied to adult learners, is based on the conceptual framework on an experiential learning model. The foundation of the model is a description of the learning cycle of how adult experience is translated into concepts, which are then used as guides on the choice of new experiences.

The model is described as four basic learning modes: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). Kolb proposed that an integrated learner would use all four of these modes. However, he added that most learners, due to heredity, past personal experiences, and societal expectations, usually develop only one of these modes as their most effective method of learning. The four modes of learning form two bipolar dimensions along two separate axes thereby forming four separate quadrants. These four quadrants represent four distinct groups of learners (Figure 1).

1. The Diverger. This learner's dominant learning style includes concrete experiences (CE) and reflective observation. The greatest strength of these individuals lies in their imaginative ability such as "brainstorm" ideas.
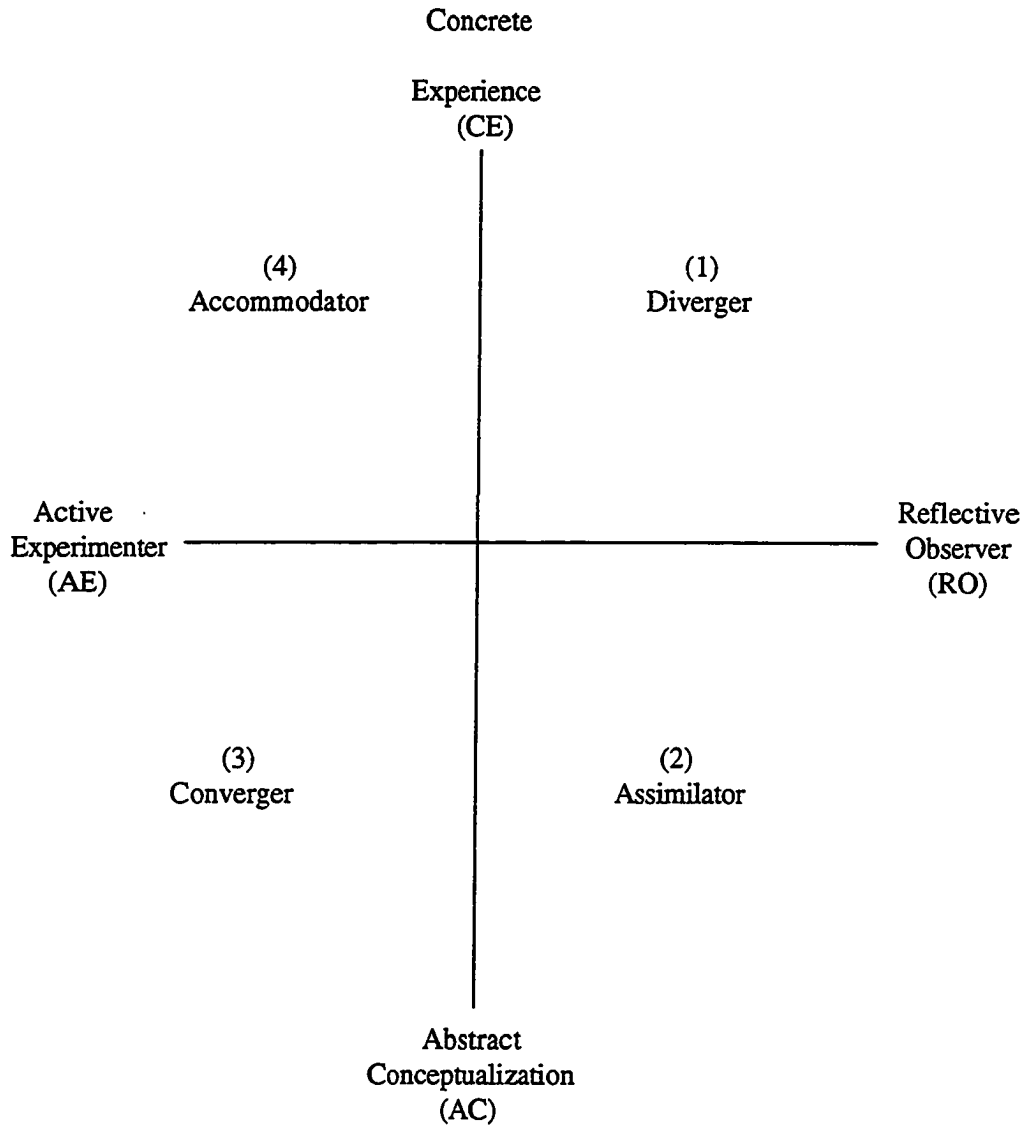
2. The Converger. Such learners dominant learning abilities are abstract conceptualization (AC) and active experimentation (AC). The strength of these learners is to demonstrate a practical approach to the application of ideas.

3. The Assimilator. The dominant learning styles include abstract conceptualization (AC) and active experimentation (AE). These learners demonstrate ability to create theoretical models and inductive reasoning skills.

4. The Accomodator. This learning mode include abstract conceptualization (AC) and active experimentation (AE). Their strength lies in the ability to carry out plans and experiments to completion and involving themselves in new experiences.

These four groups of learners can be further categorized according to their position along the two axes. For example, when evaluating a learner's placement along the active experimentation-reflective observation axis, divergers and assimilators would be classified as having a reflective-observation style while accommodators and convergers would be classified as having an active-experimentation style.

Many different variations of Kolb's model are in use today. The Kolb Learning Style Inventory (LSI) was the initial assessment instrument developed for this model. An alternate form of this instrument, the Learning Style Questionnaire (LSQ), was designed to assess the learning styles of undergraduate students and was shown to be valid and reliable by Marshall & Merritt (1986). Kolb's learning model and instrument is one of the most expansively used learning style tools to assess adult learners in education and management training. Curry (1987) stated that Kolb's instruments have strong reliability but only fair validity.

Concrete

Experience
(CE)

(4)
Accommodator

(1)
Diverger

Active
Experimenter
(AE)

Reflective
Observer
(RO)

(3)
Converger

(2)
Assimilator

Abstract
Conceptualization
(AC)

Figure 1. Four Quadrants of Kolb's (1984) Learning Style Model

<center><u>Dunn and Dunn Model</u></center>

The Dunn and Dunn Model was first introduced in the late seventies (Dunn & Dunn, 1978). Their learning style model was classified as multidimensional. The five sub scales are composed of environmental, emotional, sociological, physiological and psychological areas, and each group is comprised of twenty one sub-categories. The environmental stimulus includes the elements of sound, light, temperature and design. The emotional category includes motivation, persistence, responsibility, and structure. The sociological stimulus includes elements of learning alone, in a pair, with peers, or as part of a team, with an authoritative or collegial teacher, or in varied treatments or combination of social patterns. The psychological element includes global/analytical, hemisphericity, and impulsive/reflective characteristics. The physiological characteristics include preferences of auditory, visual, tactile, and kinesthetic learning style strengths (Dunn & Dunn, 1978).

The Dunn and Dunn model is based on the premise of a diagnostic prescriptive approach that is initiated through the identification of learners' style through a self reported instrument. From the Dunn and Dunn model, three instruments have materialized. Such instruments are the Learning Style Inventory (LSI); which is in three different forms for grades 3 through 12; the LSI Primary Version, developed by Janet Perrin (1983), which is for identifying the learning styles of young nonreaders; and the Productivity Environmental Preference Survey (PEPS), which is mainly for adult learners (Price, Dunn & Dunn, 1996). Extensive research utilizing the LSI model is one of the highest reliability and validity ratings and is the one of the most widely used instruments

for learning style assessment (Keefe & Monk, 1982; Curry, 1987; Kirby, 1979 and Keefe, 1982).

<div align="center">Productivity Environmental Preference Survey (PEPS)</div>

The Price, Dunn, and Dunn (1996) Productivity Environmental Preference Survey (PEPS) is a comprehensive learning style inventory that measures a combination of elements that may influence student achievement and attitude. The inventory provides information about patterns through which learning occurs, not reasons why patterns exist or the underlying psychological factors involved (Price et al. 1996). The utilization and effectiveness of the PEPS instrument to assess the preferred learning style of college students has been clearly documented in the educational literature (Coolidge-Parker, 1989).

In the PEPS model the four related elements are environmental, emotional, physical, and sociological (Price, 1987). The environmental elements include noise level, preference for sound or quiet while learning, light, a preference for bright or dim lighting while studying, temperature preferences for being hot or cold while concentrating or studying, and design of the environment, either formal, such as sitting in a chair, or informal, such as sitting on a bed or a floor. The model also identifies psychosocial elements. These include motivation, which in this context is the desire to achieve academically, persistence, the inclination to complete tasks without a break versus the inclination to take breaks and then return to tasks, responsibility, the desire to do what is expected-a sense of conformity, and structure, the need for specific directions to complete assignments or goals (Price et al. 1996).

The sociological elements pertain to a preference for others to be present in the learning environments. The scale alone reflects a range of responses from strong preferences for studying with others to studying alone. Authority refers to the preference for being directed by or having available a person with special knowledge. A third factor, learning in several ways, accounts for those individuals who can learn alone, with peers, or with authority figures present (Price et al. 1996).

The PEPS model also examined the physical elements of learning preferences. The auditory scale is used to describe learners who prefer to listen to a lecture, discussion, recording, or verbal instruction to learn new or difficult material. The visual scale, on the other hand, identifies learners who prefer to learn by reading. The tactile subscale is used to identify preferences to facilitate learning by underlining, or taking notes, or otherwise keeping the hands busy, whereas a kinesthetic learner requires whole body movement to absorb and retain information, such as performing a procedure or experiencing the event to be learned. Mobility refers to learners who prefer to take frequent breaks and have an opportunity to move as opposed to sitting for hours while learning. The subscale called "requires intake" identifies preferences for learners who drink or chew while concentrating.

The physical elements also identify preferences for time of day for studying such as late morning, late afternoon, or evening-morning, a continuum of preferences that could be either morning or evening. However, the PEPS does not identify such aspects of an individual's skills, such as the ability to outline planned procedures, to organize work, to classify, or to analyze. Instead, it describes how an adult prefers to learn, not the skill that

is used to perform the learning process. Regardless, if adult learners adhere to the self-reported learning preferences, they will maximize the use of learned skills, remove obstacles to creativity, and increase academic performance (Price et al. 1996).

Administration of the PEPS consists of a 100 item questionnaire in which adult learners provide answers on a Likert scale. A computerized summary profile is offered to the adult learner where the raw score is the sum of an individual's responses to each of the items within an area. The standard score ranges from 20 to 80 with a mean of 50 and a standard deviation of 10. The standard score is based on a random sample of 1,000 subjects from a national data base of 80,000 who have taken the PEPS. Individuals having a standard score of 40 or less or 60 or more find that variable important when they study or work. Individuals having scores that fall between 40 and 60 are varied with respect to how much that variable is important to them (Price et al. 1996).

Several research studies in specific areas, involving learning styles of adult learners, have been reported utilizing the PEPS. Such areas include (1) career studies -- (court reporters) (Coolidge-Parker, 1989); (2) cognitive style (adults productivity style of right and left cerebral dominance and adults relationship of global style to productivity (Bailey, 1988; Price et al. 1996) and ; (3) college students -- (comparison of productivity style to cumulative grade point average, comparing the differences between the academic levels of students and their productivity style, comparison of the productivity style of undergraduate commuters and non-commuters, and usefulness of ACT and learning style in predicting success in college based on academic credit hours achieved and GPA, ethnic differences, Gender differences, Instructional methodology, and stress) (Price et al. 1996).

CAPSOL®: Computerized Assessment and Prescription of Styles of Learning

The CAPSOL® learning style inventory assesses the preferred learning style of two categories, the sensory learning styles (visual, auditory, and kinesthetic) and expressive learning styles (individual or group learner, oral or written leaner, and sequential or global learner). (Henderson & Conrath, 1991)

Sensory learning styles have been labeled as visual, auditory, and kinesthetic. Students who demonstrate a visual learning style as their preferred mode of learning are characterized by seeing words and numbers in a book, on a chalkboard, on charts or in workbooks (Henderson & Conrath, 1991). According to Henderson and Conrath (1991), these students may be observed writing down much of what they hear. It is important for them to be exposed to written material and other visual media and that they take notes as they listen to what is being said in class. These students do not need much oral explanation, rather it would better that the teacher write words and concepts on the chalkboard. These students would also gain from games or activities which have sight cards or other sight materials.

Visual learners perceive the interrelatedness of the parts of any situation; thus, their learning is holistic and occurs in an all-or-none fashion. They are most likely to experience the "Aha" phenomenon, when all of a sudden they "get it." This type of learning does not take place through a series of steps, and if these people are asked to retrace their steps in the learning process, they usually cannot. From the time they can talk, individuals of this orientation arrive at surprising conclusions (Silverman, L. 1989).

According to Silverman (1989), visual learners need a "gestalt" approach to learning. (Gestalt refers to a form or configuration having properties that be derived by the summation of its component parts, Cayne, (1993) New Websters Dictionary and Thesaurus, p. 401). Visual learners do best when they deal with whole systems, abstract relationships, major concepts, inductive learning, and problem solving. They excel when provided with manipulatives, visual representations, models and computers. Teachers may be able to relate to their learning style if they ask themselves, "How would I teach this concept to a deaf student?" The following are seven adaptations of traditional teaching methods that have been found to be effective by Silverman (1989) for serving visual learners:

1. Visual learners remember what they see and forget what they hear, so show them. Write directions on the board, on overheads, or on paper. Use visuals and hands-on experience.

2. Visual students are not step-by-step learners, so give them the big picture first. Tell them goal of instruction and let them figure out their own way of getting there while the rest of the class is being taught.

3. If students have difficulty with sequential tasks but grasp complex concepts, give them advanced work, even though they have not mastered the easier work. Consider acceleration in some subject areas.

4. Remedial techniques may not be effective, as they were designed for students with a different learning style; instead teach visual learners to compensate for sequential weaknesses and poor rote memory.

5. Avoid timed tests.

6. Use a sight approach to reading and reading material that is rich in fantasy and visual imagery.

7. Let visual learner observe others who mastered the objective (i.e. skill or lesson) before attempting new tasks (p. 18).

The visual learner is related to the term imitative learner. Imitative learning is the process by which one person observes and models the behavior of another and at later time independently reproduces that behavior (Van Wagenen, 1971). Both modeling and observing during imitative learning may be either deliberate or accidental. Learning by imitation occurs in formal learning environments, sometimes by deliberate demonstrations. At other periods, some visual learners may then observe the behavior without the necessity of an intentional demonstration. Learning by imitation, however, is believed to be most frequent in social contexts where teaching and learning are not directly intended (Van Wagenen, 1971).

Van Wagenan (1971) however points out that imitative learning has limitations as a learning process:

> As an observer, one deliberately seeking to imitate, who has a limited history of making fine differentiations discovers that the delicate variations of modeled response are difficult or impossible to distinguish from the gross motor aspects of the model's behavior. It is helpful to be able to draw from past experience in making similar movements. Additional limitations are imposed on the observer's performance by the fact that initially he cannot attend simultaneously to multiple aspects of the behavior of the model. The gross motor behavior is learned first, while the less discriminable aspects of behavior are noted and acquired later (p. 413).

Students who demonstrate an auditory learning style as their preferred mode of learning are characterized by vocalizing to themselves or can be observed moving their lips or throats as they read, particularly if they are striving to understand new material (Henderson & Conrath, 1991). According to Henderson and Conrath (1991), it would be beneficial for the auditory student to experience audio tapes, classroom lectures, oral

practice (out loud) and class discussion. Students who utilize the auditory style as their dominate mode of learning might benefit from the use of a tape recorder in cases where there are games or other classroom activities attempting to disseminate information. They would also benefit from repeating words, ideas, and concepts to themselves as part of their learning process.

Students who demonstrate a bodily-kinesthetic learning style as their dominant preferred mode of learning are characterized by doing or being involved, particularly with objects to be handled. Henderson and Conrath (1991) believed that these students may appear very restless if they are not involved during the class activity. They might fidget and play with their pencils or tap their finger. These students should become involved with another student or group of students in a specific activity related to the assignment. A bodily-kinesthetic dominant learning style student would benefit more by being involved with pictures, objects, drawings and the like. They learn best by experiencing. They need a combination of stimuli as they become involved in activities. These students seek to handle and to touch and to be totally involved with the activity.

In language courses, kinesthetic learners may have difficulty in completing assignments. According to Simeone (1995), kinesthetic learners learn by "doing," and many language arts activities are passive. The challenge lies in providing these learners with bridges to conceptual awareness. Simeone provides an example of how she utilized small group cooperative learning activities with athletes and musicians involving a filmed interpretation of Hamlet. She writes:

> Students were expected to demonstrate mastery level of understanding
> of character development and theme through video translation. Some
> students choose a straight-forward acting interpretation but get creative

with features of setting: for example, Hamlet and Ophelia may be clothed in *Star Wars* garb. My favorite was composed by a group of musicians in one of my classes. It involved a musical interpretation of Mel Gibson's *Hamlet*. It took me by surprise and caused some anxiety about copying and editing laws, but I to [sic] acknowledge their creativity. The students dubbed in their own voices and selected music which translated beautifully Hamlet's mood changes as he articulated his impotent rage. Looking at my students' test scores indicates that playful interpretation enhances comprehension of character and theme (p. 61).

The individual learner involves thinking and working best by oneself. These students generally are able to motivate themselves and may find working with other students distracting (Henderson & Conrath, 1991). According to Henderson and Conrath (1991), individual learners are fairly confident as they develop their own opinions and ideas. They enjoy spending time alone thinking through certain concepts. They enjoy working in quiet library spaces and may find that working in a group causes them to become fairly uncomfortable or impatient. In a related study presented by Dempsey, Lucassen, Haynes & Casey (1996), findings demonstrated that individual learners that worked on self-paced computer games were more accommodating to the challenge of the rigor of the game and wanted to have clear concise instructions of how to be successful with the game and became frustrated when they were unsure of the game's objective.

The term individual learner is closely related to the introverted learner. Introversion was defined as the learner who brings energy to the learning situation by looking at the content to be learned in terms of his/her own values and interests (Hanson, 1996). For learning that has any retentive value, the introverted student must have had time to think and reflect about that information in his/her own independent and highly individual way. How much energy the introvert invested depended on the degree to which

the content increased that learner's own self-awareness and goals. Introverts seemed quiet, shy, withdrawn, and hard to get to know. Introverts represent 25% of the student population but constitute 85% of its best students (Hanson, 1996).

The group learner studies with at least one other person to make learning more effective. According to Henderson and Conrath, (1991) these students were often interacting with others and sometimes cause classroom distractions through their socializing. They valued others' opinions, they learned better by being stimulated by others rather than their own thinking, and they found it important to become involved in a social group. Group interaction (socialization and discussion) was the major motivation for these students to enhance their learning (Henderson & Conrath, 1991).

The oral expressive learner initiated the desire to speak fluently and comfortably (Henderson & Conrath, 1991). Henderson and Conrath (1991) noted this student would much rather make oral reports than written. Oral expressive learners had a high level command of the language, they spoke fluently, and did not have to be encouraged to speak expressively as they outlined their ideas. Oral expressive learners found that they saved time by using tape recorders. To strengthen the oral expressive learners' abilities, Henderson and Conrath (1991) recommended assigning less written work; however, they insisted on good quality in order to insure the necessity of the basics in composition and grammar.

The learner whose preferred learning style is sequential describes a structured process of organizing thoughts and ideas (Henderson & Conrath, 1991). Henderson and Conrath (1991) suggested the sequential learner liked plans, pre-planned agendas and

structure. They solved problems in a logical way, admired detail and made lists to accomplish goals. Generally, they worked on one task at a time until it is finished.

The global learner is described as ordering thoughts and ideas in an unstructured fashion (Henderson & Conrath, 1991). Henderson and Conrath (1991) found that these students liked to know the main idea, wanted to create their own way of completing tasks and preferred to work on many tasks at a time. In order for college teachers to meet their needs, these students' preferred learning style requires global opportunities. The results of the study of the National Commission on the Role and Future of State Colleges and Universities in 1985 (Anonymous, 1986) substantiates the need for universities to offer a more global curriculum. In general, the Commission made three recommendations for universities to assist in providing a more global education. They found:

> First, college students must be provided with an international perspective
> that reflects the world in realistic social, political, cultural, and economic
> terms. Second, college students must develop international communication
> skills that will enable them to think, behave, and work effectively in a world
> of rapid change. Third, colleges must assist - through research, technical
> assistance, study, and international service programs - in the resolution of
> international problems with the same commitment that education institutions
> now address domestic issues (p. 31)

Learning Style and Other Classifications

Educational researchers have studied the relationships of preferred learning styles and other classifications of college students. Such classifications are gender, age, class standing, and academic major. Researchers in education believe that such relations could have implications of how instructors should structure their teaching strategy as well as how students may increase the efficiency of their learning. Ginter, Scalise, Brown, and

Ripley (1989) assessed the perceptual learning styles of 378 college students. The focus of this investigation was to determine if the students' perceptual learning styles differed among their age, gender, and class standing. They found that learning style did not differ with respect to class standing or gender but the type of learning style differed with respect to age. However, results revealed that students who are older (25 and older) preferred to be more written expressive learners than younger students (20 and younger) who prefer to be more visual learners. In a similar study, Galbraith and James (1984) assessed the preferred learning styles of 319 adult learners from noninstitutional settings. The age range of the 240 of subjects assessed was 20 to 49. Results revealed that for this age range's the preferred learning style was visual. In the same study, the results showed individuals in this age range preferred haptic as their second most preferred learning style. Galbraith and James (1984) define haptic as "individuals who learn best through the sense of touch.... A haptic person assimilates information through a 'hands on' approach to learning" (p. 451).

In another study, Galbraith and James (1987) measured the preferred learning styles of 319 adult learners from five different educational backgrounds who had no high school diploma to those with graduate degrees. The instrument they utilized was the Multi-Model Paired Associates Learning Test. This instrument measures the sensory preferred learning styles of print (a person who is print oriented often learns best through reading and writing); aural (a person who is aurally oriented generally learns best through listening); interactive (individuals who learn best through verbalizations usually are interative learners); haptic (individuals who learn best through the sense of touch);

kinesthetic (a person who is kinesthetically oriented learns best while moving), and olfactory (individuals who learn best through the senses of smell and taste are olfactory learners). The results revealed that visual, interactive, and haptic were the three most dominant learning styles of all six types of adult learners with visual as the most dominant.

Learning style researchers have assessed the preferred learning styles differences between sexes. Philbin, Meir, Huffman, and Boverie (1995) assessed the preferred learning styles of the 72 adult learners (45 males and 27 males) using Kolb's Learning Style Inventory. The ages ranged from 21 to 60 years with 23 people in the 21-30 age group as the largest group represented. The educational background of the subjects ranged from high school diploma (2), some college (18), Associate Degree (6), Bachelor's Degree (18), Master's Degree (19), and Doctoral (2). The results revealed that adult women were different than males as divergers. According to Kolb (1981), the diverger learner's dominant learning style included concrete experiences (CE) and reflective observation (RO). The greatest strength of these individuals lay in their imaginative ability such as "brainstorm" ideas. Divergent learners were classified as people who preferred to have "hands-on" or tactile types of learning opportunities that have a definitive ending point. In contrast, male learners were different than female learners as assimilators, who prefer to logically organize and analyze information, building testing theories, and designing experiments. Assimilators are best viewed as sequential learners because they require to follow a pattern to arrive at the answer to a problem (Kolb, D. 1981). Matthews (1995) conducted another study that measured the gender differences of preferred learning styles of 2,429 undergraduates (1,109 males and 1,320 females) from

four universities that would assist college teachers in South Carolina. Matthews (1995) found that female college students (60.3%) have a higher preference percentage score as sequential learners than male college students (37.0%). However, the results of a similar study conducted by Philbin et al (1995) disagree with these findings. Their results revealed that adult male learners had a higher percentage score (86.0%) as assimilators than female adult learners (10.0%). Matthews' results also revealed that male college students revealed a higher preferred percentage score (53.3%) as a group learner than females (46.7%) and female college students revealed higher preferred percentage score (66.3%) as an individual learner than the males (33.7%). Belenky, Clinchy, Goldberger, and Tarule (1986) voiced two concerns as to why more male learners are more group learners and why females are more individual learners. They write:

> The first concern was that conception of knowledge and truth that are accepted and articulated today have been shaped throughout history by the male-dominated majority culture (p. 5).... Modes of learning that are common, if not specific, two women have been devalued. In other words, rationalism and objectivity are valued over intuitive, personal knowledge (p.6).... The second main concern was that development theory has established men's experience and competence as a baseline against which both men's and women's development is judged, often to the detriment or misreading of women (p. 7).... This bias is demonstrated with clarity in the models of intellectual development. Even in studies of women's intellectual development, the modes of learning cultivated and valued by men are studied rather than ways of knowing more common to and highly developed in women (p. 9).

Based on the concerns presented by Belenky et al. (1986) it appears historically that when women enrolled in higher education they were at a gender number disadvantage and therefore possibly had to be more independent. This possibly caused them to be more of an individual learner than males.

Educational researchers have postulated that as learners mature their developmental learning strategy is enhanced. As the learner incorporates more strategies into their repertoire, they will be able to utilize different aspects of each strategy when learning new information (Waters, 1982). Therefore, this position may suggest that a change in learners' preferred learning style may occur as they mature and receive further education. From a developmental stage, Waters (1982) measured the relationships between metamemory, strategy use, and performance of 144 high school and junior high students (72 eighth graders and 72 tenth graders). Results revealed that, when asked, tenth graders utilized more (four) learning strategies to perform the memory task than the eighth graders (one). Results of this study may suggest as learners continue through postsecondary education the student may further solidify a specific preferred learning style. However, Geiger and Pinto (1991) found that college students preferred learning style did not change from their freshman year to their senior year. Nevertheless, educational researchers believe that instructors must correctly identify the preferred learning style and develop a paradigm which describes the objective of the lesson and then reinforce the best effective teaching strategy to achieve the objective (Eggen, Kauchak & Harder, 1979). Researchers believe that teachers have many opportunities to teach learning competencies and at the same time teach knowledge, skills, and attitude that comprise content areas. Eggen et al. (1979) provided an example through teaching about the court system of the United States. They write:

> Introducing the court system used in the United States, teachers often try to relate legal forms of settling disputes to their students' experience with arguments and disagreements. They compare the judge to the teacher, parent, or police officer who tries to settle the difference, or to decide who is to blame for the damage. The jury may be compared to a group of friends who try to help two

members of a group settle a dispute, and so on. Clearly, the instructor is trying to help his or her students understand the court system by relating the components to their own experiences and previous knowledge by creating analogies. With very little effort, this excellent teaching device could also be used as part of the metacurriculum for teaching learning strategies simply by making the technique explicit. Instead of just presenting these analogies and then continuing with the class, the teacher could take a few moments to draw attention to the method being used, why he or she thought it would help the students learn the new information, and how they could use this technique on their own when studying (p. 255).

O'Neil (1990) suggested it may not be possible for one instructor to effectively fulfill each preferred learning style in the class. Therefore, he matched that class with a team of instructors with similar learning styles displaying a variety of teaching strategies attempting to reinforce all the preferred learning styles. O'Neil believed this method will decrease burnout by the instructor.

<center>Conclusion</center>

It is evident by the preceding literature review that many authors have provided several theories of how people learn. From the ancient Greeks, to comtemporay theorists, the thoeries of learning have evolved over the centuries. Several types of learning processes, called learning styles, have been identified as to how students can process information. In order to identify how students learn, educational researchers have developed several instruments that measure specific learning styles for different age levels. Such learning style instruments included Keefes' Learning Style Profile, that measures secondary students' learning styles, Schmecks' Inventory of Learning Processes, that measures the preferred learning styles of college students, Dunn and Dunns' preferred learning style model that measures environmental, emotional, sociological, physiological,

and psychological learning styles of all ages, and Henderson and Conraths' CAPSOL®

that measures sensory (visual, auditory, and kinesthetic) and expressive (individual or

group, oral or written, and sequential or global) learning styles of all ages. Instructors

should establish their own rationale and justification of what instrument they want to

utilize to measure their students' preferred learning style. Once the instructor has

established the instrument that they believe is most conducive to his/her student

population, she/he needs to tailor teaching strategies to meet the preferred learning styles

of students.

CHAPTER III

METHODS

On a daily basis in their classroom, college teachers encounter students who may possess various learning styles. Students who enroll in courses comprised of students from a variety of academic majors may present a variety of learning styles. With such diversity, the academic success of a student may be hindered because instructors may not teach to the learning strength of that student. Therefore, the purpose of this study was to determine the learning style modes of undergraduates who enrolled in a core curriculum course introductory health course at Middle Tennessee State University.

Subjects

Of the 688 students enrolled in a physical education core curriculum Effective Living Health course during the 1998 spring semester at Middle Tennessee State University, 603 (88%) undergraduates were accessible as subjects for this study. This decline in student participation was attributed to students that were not in attendance the day the CAPSOL® instrument was administered. Approval for the use of human subjects was obtained from the Internal Review Board (IRB) from Middle Tennessee State University (Appendix A).

Design Scheme of the Study

The Effective Living Health course instructors at MTSU during the 1998 spring academic semester were given a letter of request (Appendix B) for permission to administer the CAPSOL® learning style instrument (Appendix C) during class time.

Instructors signed letters of request to grant permission.

Before administering the CAPSOL® instrument, each subject read a consent form (Appendix D). The primary investigator administered each instrument to each subject. In order to insure consistency of administering the CAPSOL® instrument, a scripted instructional form (Appendix E) was read to the subjects before they started CAPSOL®. The subjects were told that their participation was completely voluntary and it would not affect their course grade if they chose not to participate. Subjects were shown an illustration of how to mark their answers on the scantron sheet corresponding to the CAPSOL® instrument. Subjects were instructed to answer each question as honestly as possible and to mark the first answer that came to mind. Each scantron sheet was examined by the investigator for completion as the students turned in their instrument.

Statistical Analysis

Following the data collection, the raw data from the completed CAPSOL instruments were entered into SPSS® database statistical program (8.0 Release)(SPSS, Chicago, IL). The statistical objective was to determine the largest sampling of "high preference and low preference" percentages scores of learning styles of the overall sample and the largest sampling of "high preference" percentage score of learning styles of academic majors, academic standing, age range, and gender. A frequency summary was calculated of the percentage scores of each sub-scale (visual, auditory, bodily-kinesthetic, individual learner, group learner, oral expressive, written expressive, and sequential and global learner) of students enrolled in the Effective Living Health course on the CAPSOL®.

CHAPTER 4

RESULTS

Subject Demographics

During the instrument administration, demographical questions were asked of the students who were enrolled in the Effective Living Health course. The demographics of gender, academic standing, and age range are located in Table 1 and the academic major demographics are located in Table 2.

Reliability of the CAPSOL® instrument

The reliability of each sub-scale was determined by computing the internal consistency utilizing Cronbach's reliability coefficient alpha from the 603 student's responses. The alpha level for each subscale is shown in Table 3. The coefficient alphas obtained ranged from .41 - .85 with a mean of .67. Any subscale falling below an alpha level of .40 was considered as unacceptable (Henderson & Conrath, 1991). The coefficients of each subscale obtained from the 603 subjects indicated the CAPSOL® instrument was reliable.

Interpretation of Scores

The raw scores obtained from the students from each question on the CAPSOL® were configured on a Likert scale with values ranging from four to one. The value of four was titled "most like me," the value of three was titled "a lot like me," the value of two was titled "a little like me," and the value of one was titled "not like me." Scores ranging from 16 through 20 indicated a "high preference" for that particular learning style. Scores ranging from 10 through 15 indicated that the student may utilize this learning style sporadically.

Table 1   <u>Demographics of Subjects</u>

<u>Age Range</u>
(N = 603)

	<u>Frequency</u>	<u>Percentage</u>
17 - 22	452	75.0
23 - 28	106	17.6
29 - 34	29	4.8
35 - 40	9	1.5
41 - ➡	7	1.2

<u>Grade Level</u>
(N = 603)

	<u>Frequency</u>	<u>Percentage</u>
Freshman	208	34.5
Sophomore	168	27.9
Junior	123	20.4
Senior	74	12.3
More than four years	30	5.0

<u>Gender</u>
(N = 603)

	<u>Frequency</u>	<u>Percentage</u>
Female	231	38.3
Male	372	61.7

Table 2   Demographics of Academic Majors
   (N=603)

	Frequency	Percentage
College of Basic and Applied Sciences	**132**	**22.9**
Aerospace	6	4
Agribusiness and Agriscience	7	5
Animal Science	11	8
Biology	19	14
Chemistry	8	6
Computer Science	13	1
Engineering Technology	12	9
Industrial Technology	2	1
Mathematical Sciences	13	1
Nursing	35	26
Physics	1	.7
Plant & Soil Science	4	3
Pre-Veterinary Medicine	1	.7
College of Business	**81**	**13.4**
Accounting	14	17
Business Education	21	26
Computer Information Systems	8	10
Economics	3	4
Finance	9	11
Management	17	21
Marketing	9	11
College of Education	**169**	**28.0**
Criminal Justice	13	7.6
Early Childhood Education	14	8
Elementary Education	54	32
Environmental Science and Technology	2	1

Family and Consumer Studies	5	2.9
Health Education	9	5
Interior Design	5	2.9
Nutritional & Food Science	3	1.7
Physical Education	10	5.9
Psychology	29	17
Recreation	4	2.3
Science Education	10	5.9
Special Education	8	4.7
Textiles Mechandising and Design	3	1.7
College of Liberal Arts	**83**	**13.8**
Anthropology	4	4.8
Art	9	10.8
Art Education	3	3.6
English	13	15.6
Foreign Language	3	3.6
Geoscience	1	1.2
History	4	4.8
International Relations	1	1.2
Music	4	4.8
Philosophy	1	1.2
Political Science	10	12
Social Studies	1	1.2
Sociology	18	21.6
Speech and Theater	11	13.2
College of Mass Communication	**90**	**14.9**
Mass Communication	52	57.7
Recording Industry	38	42
Undecided	**48**	**8.0**

Table 3.

Internal Consistency Reliability from a Two-Way ANOVA Cronbach's Alpha Model of

the CAPSOL® Subscales (N= 603)

Subscale	Alpha (α)
Visual	.61
Auditory	.45
Bodily Kinesthetic	.68
Individual	.82
Group	.85
Oral Expressive	.80
Written Expressive	.74
Sequential	.68
Global	.41

α < .40 is unacceptable (Henderson & Conrath, 1991)

Scores ranging from 5 through 9 indicated a "low preference" for that particular learning style.

Research Questions

In each of the assessed categories (overall, academic standing, age range, gender, and academic college) the results of this study revealed that students have more than one identifiable preferred learning style:

What was the overall percentage scores of "high and low preference" of learning style (visual, auditory, bodily-kinesthetic, individual learner, group learner, oral expressive, written expressive, sequential, and global learner) on the CAPSOL® instrument of undergraduates enrolled in Effective Living Health courses at MTSU during the spring semester 1998?

The results of the CAPSOL® instrument revealed that 364 (60.4%) of the students considered visual as a "high preference" mode of learning. In contrast, 58 (9.6%) students considered visual learning as "low preference" of learning. The results of the CAPSOL® instrument revealed that only 79 (13.1%) of the subjects considered auditory as a "high preference" of learning and 113 (18.7%) of the subjects considered auditory as "low preference" of learning.

Students revealed on the CAPSOL® instrument that 235 (39.0%) considered bodily-kinesthetic as "high preference" of learning style. In contrast, 58 (9.6%) students considered bodily-kinesthetic as "low preference" of learning. The results of the CAPSOL® instrument revealed that 348 (57.7%) considered individual learning as a "high

preference" of learning. Inversely, 51 (8.5%) students determined that individual learning was as a "low preference" mode of learning.

Two hundred and seventy students (44.8%) disclosed results on the CAPSOL® instrument that group learning was a "low preference" of learning style. However, only 64 (10.6%) students identified that they had a "high preference" for group learning. In the oral expressive learning style, 154 (25.5%) students revealed that they have a "high preference" for this learning style. Conversely, 143 (23.7%) students indicated a "low preference" of oral expressive learning style. However, the majority of the students, 306 (50.7%) indicated they utilized oral expressive as a learning style now and then.

One hundred and nineteen (19.7%) students indicated a "low preference" of the written expressive learning style. One hundred and fifty six (25.9%) students indicated a "high preference" of the written expressive learning style. However the majority of the students, 328 (54.4%) indicated they drew on written expressive as a learning style sporadically.

Students revealed on the CAPSOL® instrument that 59 (9.8%) considered sequential learning as a "low preference" of learning style. In contrast, 156 (25.9%) students considered sequential learning as a "high preference" for learning. However, the majority of the students, 318 (52.7%) indicated they used sequential learning as a learning style sporadically.

Students revealed on the CAPSOL® instrument that 74 (12.3%) considered global learning as a "low preference" of learning style. In comparison, only 88 students (14.6%) considered global learning as a "high preference" for learning. However, the majority of

the students, 441 (73.1%) indicated they relied on global learning as a learning style

occasionally. The results of research question 1 are illustrated in Table 4.

What academic standing exhibited the largest "high preference" percentage

score on the CAPSOL® instrument of learning styles (visual, auditory, bodily-kinesthetic,

individual learner, group learner, oral expressive, written expressive, sequential, and

global learner) of undergraduates that enrolled in an Effective Living Health course at

MTSU during the spring semester 1998?

The results of this study showed that students classified as sophomores and

enrolled in college more than four years were the only two academic standings that

revealed the largest percentage score of "high preference" of every learning style category

on the CAPSOL® instrument. The students who have been enrolled in college for more

than four years demonstrated the largest "high preference" learning style percentage score

(30.0%) as a visual learner. Sophomore students exhibited the largest "high preference"

learning style percentage score (16.0%) as an auditory learner. The students who have

been enrolled in college for more than four years portrayed the largest "high preference"

percentage score (50.0%) as a bodily-kinesthetic learner. The same students exhibited the

largest "high preference" percentage score (66.7%) as an individual learner. Sophomore

students showed the largest "high preference" percentage score (51.2%) as a group

learner. The sophomore students also exhibited the largest "high preference" percentage

score (28.0%) as an oral expressive learner. The students who had been enrolled in

college for more than four years revealed the largest "high preference" style of learning

Table 4.

Largest Samplings of Overall "High and Low Preference" of Learning Style Percentage

Scores on the CAPSOL® of Undergraduates (N=603) that Enrolled in Effective Living

Health Courses at MTSU During the Spring Semester 1998

Learning Style Category	"High Preference" (n) and % score	"Low Preference" (n) and % score
Visual Learner	(364) 60.4%	(58) 9.6%
Auditory Learner	(79) 13.1%	(113) 18.7%
Bodily-Kinesthetic Learner	(235) 39.0%	(58) 9.6%
Individual Learner	(348) 57.7%	(51) 8.5%
Group Learner	(64) 10.6%	(270) 44.8%
Oral Expressive Learner	(154) 25.5%	(143) 23.7%
Written Expressive Learner	(156) 25.9%	(119) 19.7%
Sequential Learner	(156) 25.9%	(59) 9.8%
Global Learner	(88) 14.6%	(74) 12.3%

percentage score (33.3%) as a written expressive learner. Sophomore students exhibited the largest "high preference" learning style percentage score (44.0%) as a sequential learner. Similarly, the same student indicated the largest "high preference" learning style percentage score (16.7%) as a global learner. The results of research question 2 are illustrated in Table 5.

What age range (17-22, 23-28, 29-34, 35-40, 41 and older) exhibited the largest "high preference" percentage score on the CAPSOL® instrument of learning styles (visual, auditory, bodily-kinesthetic, individual learner, group learner, oral expressive, written expressive, sequential, and global learner) of undergraduates that enrolled in an Effective Living Health course at MTSU during the spring semester 1998?

The age range 35-40 exhibited the largest "high preference" learning style percentage score (55.6%) as a visual learner. The age range 29-34 expressed the largest "high preference" percentage score (17.2%) in the auditory learning style category. The age range 23-28 offered the largest "high preference" percentage score (47.2%) as a bodily-kinesthetic learner. The age range 41 and older displayed the largest "high preference" percentage score (71.4%) as an individual learner. The age range 17-22 reported the largest "high preference" percentage score (11.1%) as a group learner. The age range 23-28 demonstrated the largest "high preference" percentage score (33.0%) as a oral expressive learner. The age range 41 and older showed the largest "high preference" percentage score (42.9%) as a written expressive learner. Furthermore, 41 and older revealed the largest "highest score (57.1%) as a preferred sequential learning style. The

Table 5.

Largest Samplings of "High Preference" Learning Style Percentage Scores by Academic
Standing* on the CAPSOL® of Undergraduates (N=603) that Enrolled in Effective Living
Health Courses at MTSU During the Spring Semester 1998

Learning Style Category	Academic Standing	"High Preference" (n) and % score
Visual Learner	More than four years	(9) 30.0%
Auditory Learner	Sophomore	(27) 16.0%
Bodily-Kinesthetic Learner	More than four years	(15) 50.0%
Individual Learner	More than four years	(20) 66.7%
Group Learner	Sophomore	(86) 51.2%
Oral Expressive Learner	Sophomore	(47) 28.0%
Written Expressive Learner	More than four years	(10) 33.3%
Sequential Learner	Sophomore	(13) 44.0%
Global Learner	Sophomore	(28) 16.7%

* Academic Standing (n): Freshman: (208); Sophomore: (168); Junior: (123); Senior:
(74); and More than four years: (30)

age range of 23-28 exhibited the largest "high preference" percentage score (16.0%) as a

global style of learning. The results of research question 3 are illustrated in Table 6.

Which gender exhibited the largest "high preference" percentage score on the

CAPSOL® of learning styles (visual, auditory, bodily, kinesthetic, individual learner,

group learner, oral expressive, written expressive, and sequential learner) of

undergraduates that enrolled in an Effective Living Health course at MTSU during the

spring semester 1998?

Of the 603 students, male (31.2%) and female (32.0%), both exhibited very little

difference between the reported "high preference" percentage score as visual learners.

Therefore, both genders in the Effective Living Health course have a "high preference" for

visual learning. In the auditory learning style preference, females exhibited the largest

"high preference" percentage score (53.0%) than males (46.8%). In the bodily-kinesthetic

learning style, the male students illustrated the largest "high preference" percentage score

(46.3%) than females (35.2%). In the individual learning style profile, the female students

illustrated the largest "high preference" percentage score (58.9%) than males (50.2%).

In the group learning style profile, the male students displayed the largest "high

preference" percentage score (15.2%) than females (8.9%). In the oral expressive

learning style, male students expressed the largest "high preference" percentage score

(31.6%) than the female students (21.2%). In the written expressive learning style, female

students demonstrated the largest "high preference" percentage score (29.6%) than the

male students (19.9%). In the category sequential learning style, female students

demonstrated the largest "high preference" percentage score (45.2%), than the male

Table 6.

Largest Samplings of "High Preference" Learning Style Percentage Scores by Age Range*

on the CAPSOL® of Undergraduates (N=603) that Enrolled in Effective Living Health

Courses at MTSU During the Spring Semester 1998

Learning Style Category	Age Range	"High Preference" (n) and % score
Visual Leaner	35 - 40	(5) 55.6%
Auditory Learner	29 - 34	(5) 17.2%
Bodily-Kinesthetic Leaner	23 - 28	(50) 47.2%
Individual Learner	41 and older	(5) 71.4%
Group Learner	17 - 22	(50) 11.1%
Oral Expressive Learner	23 - 28	(35) 33.0%
Written Expressive Learner	41 and older	(3) 42.9%
Sequential Learner	41 and older	(4) 57.1%
Global Learner	23 - 28	(17) 16.0%

*Age Ranges (n): 17-22: (452); 23-28: (106); 29-34: (29); 35-40: (9); and 41 and
        older: (7)

students who exhibited a "high preference" percentage score of 25.1%. In the learning

style global learner, the male students showed the largest "high preferred" percentage

score of 16.5% than the female students who reported 8.3%. The results of research

question 4 are illustrated in Table 7.

What academic college portrayed largest "high preference" percentage score on

the CAPSOL® instrument of learning styles (visual, auditory, bodily-kinesthetic,

individual and group learner, oral expressive, written expressive, sequential, and global)

of undergraduates enrolled in an effective living course at MTSU during the spring

semester 1998?

Since there were 57 different academic majors that were identified in this study and

in order to provide a better representation of the data, the academic majors were grouped

into the five academic colleges to which each major is housed. The five colleges are

College of Basic and Applied Science, College of Business, College of Education, College

of Liberal Arts, and College of Mass Communication. The grouping of the individual

academic majors are listed in Table 3. However, 48 students were identified as having an

undecided academic major; these students were not included in the grouping of the data.

In the visual learning category, academic majors in the College Basic and Applied

Science revealed the largest "high preference" percentage score (37.1%) on the

CAPSOL® instrument. In the auditory learning category, academic majors in the College

of Education exhibited the largest "high preference" percentage score (18.3%) on the

CAPSOL® learning style instrument. In the bodily-kinesthetic learning style category, the

College of Basic and Applied Science indicated the largest "high preference" percentage

Table 7.

Largest Samplings of "High Preference" Learning Style Percentage Scores by Gender* on

the CAPSOL® of Undergraduates (N=603) that Enrolled in Effective Living Health

Courses at MTSU During the Spring Semester 1998

Learning Style Category	Gender	"High Preference" (n) and % score
Visual Learner	Male	(72) 31.2%
	Female	(119) 32.0%
Auditory Learner	Male	(108) 46.8%
	Female	(197) 53.0%
Bodily-Kinesthetic Learner	Male	(107) 46.3%
	Female	(131) 35.2%
Individual Learner	Male	(116) 50.2%
	Female	(219) 58.9%
Group Learner	Male	(35) 15.2%
	Female	(33) 8.9%
Oral Expressive Learner	Male	(73) 31.6%
	Female	(79) 21.2%
Written Expressive Learner	Male	(46) 19.9%
	Female	(110) 29.6%
Sequential Learner	Male	(58) 25.1%
	Female	(168) 45.2%
Global Learner	Male	(38) 16.5%
	Female	(31) 8.3%

Gender (n): male: (231); female: (372)

score (42.4%) on the CAPSOL® learning style instrument. As well, academic majors in the College of Basic and Applied Science showed the largest "high preference" percentage score (62.1%) as individual learners on the CAPSOL® learning style instrument.

Academic majors housed in the College of Education displayed the largest "high preference" percentage score (14.2%) as group learners on the CAPSOL® learning style instrument. Academic majors in the College of Education also exhibited the largest "high preference" learning style percentage score (29.0%) as oral expressive. Written expressive learners, whose academic majors are housed in the College of Liberal Arts, indicated the largest "high preference" learning style percentage score of 38.6%.

Students whose academic majors are housed in the College of Education displayed the largest "high preference" learning style percentage score (45.6%) as sequential learners on the CAPSOL® learning style instrument. Academic majors that are housed in the College of Liberal Arts displayed the largest "high preference" learning style percentage score (21.7%) as global learners on the CAPSOL® learning style instrument. The results of research question 5 are illustrated in Table 8.

Students whose academic major are housed in the College of Mass Communication represents one of the largest student populations of any academic college at MTSU (MTSU - Admissions Department. 1995). These students, however, did not reach the highest reported percentage as a "high preference" score in any of the learning style categories. The three largest percentage scores as a "high preference" learning style are provided below. The highest percentage score as a "high preference" learning style for students majors that are housed in the College of Mass Communication was individual

Table 8.

Largest Samplings of "High Preference" Learning Style Percentage Scores by Academic

College* on the CAPSOL® of Undergraduates (N=603) that Enrolled in Effective Living

Health Courses at MTSU During the Spring Semester 1998

Learning Style Category	Academic College	"High Preference" (n) and % score
Visual Learner	Basic & AS	(49) 37.1%
Auditory Learner	Education	(31) 18.3%
Bodily-Kinesthetic Learner	Basic & AS	(56) 42.4%
Individual Learner	Basic & AS	(82) 62.1%
Group Learner	Education	(24) 14.2%
Oral Expressive Learner	Education	(49) 29.0%
Written Expressive Learner	Liberal Arts	(32) 38.6%
Sequential Learner	Education	(77) 45.6%
Global Learner	Liberal Arts	(18) 21.7%

* Academic Colleges (n): College of Education: (169); Liberal Arts: (83); Business: (81);
Mass Communication: (90); Basic and Applied Science: (132).

learner at 60.0%. The second largest percentage score as a "high preference" learning style for such students was visual learner at 57%. The third largest percentage score as a "high preference" learning style for the College of Mass Communication students was bodily-kinesthetic at 38.9%.

CHAPTER 5

DISCUSSION

The purpose of this study was to determine the preferred learning styles of

undergraduates who enrolled in a physical education core curriculum introductory health

course. The investigation involved testing the preferred learning styles (visual, auditory,

bodily-kinesthetic, individual or group learner, oral or written expressive, and sequential

or global learner) with the CAPSOL® learning style instrument.

Results of this study indicated that the preferred learning styles of college students

in Effective Living Health courses are bodily-kinesthetic (39.0%) and visual learners

(30.0%). These results are similar to studies on learning styles completed by Dunn and

Dunn (1979), who found that students overall learning styles are 40% visual and 30-40%

tactile/kinesthetic or visual/tactile learners. Similarly, Galbraith and James (1987) showed

that the visual learner was the most predominant learning style of five different groups of

adult students with diverse educational backgrounds.

Results from this study show that students enrolled in Effective Living Health

courses have higher preferred percentage score (58.0%) as individual learners than a

preferred percentage score as group learners (10.6%). A possible explanation for this

finding is that in the beginning of a learners' education, students rely on group class work

and as the student proceeds through higher education, individually based work is the

accepted process for learning. Therefore, the students may have altered their preferences

as they progressed through to higher education. In addition, this may indicate that the preference for group work declines with maturity or further education.

Results indicated that students enrolled in Effective Living Health courses overall used oral, written expressive learning, sequential, and global learning sporadically, rather than indicating high or "low preference". Based on these results of these learning style preferences, instructors of Effective Living Health courses should be aware of the diverse methods through which material may be presented and should learn strategies to encompass a variety of teaching styles in their repertoire. According to Dunn and Dunn (1979), students' achievement and motivation increases when presented material is conveyed based on their preferred learning style. Therefore, instructors should present material through a variety of methods to fulfill each learners preferred learning style. O'Neil's (1990) research suggested implementing team teaching with a group of instructors to integrate a variety of teaching methodologies and also to avoid burnout by the instructor.

Results of the present study showed that students of Effective Living Health courses with more than four years of college revealed the highest preferred percentage score as visual learners (38.0%), bodily-kinesthetic learners (50.0%), written expressive learners (33.3%), and individual learners (66.7%). These findings were consistent with comparable studies that reveal the need to both identify and teach to specific learning styles. First, the high percentage score of visual and bodily-kinesthetic learners has been shown to be the predominant preferred learning style by Dunn and Dunn (1979) and Galbraith and James (1987) of adult learners. Second, Waters (1982) research suggested

that students learning strategy are developmentally based and as the learner matures and is further educated their preferred learning style will change. Therefore, since higher education academics are more individually based this results may substantiate the reported high preferred percentage score as individual learners for the students who have been enrolled in college more than four years. This thought is contradicted by Geiger and Pintos' (1991) research that 55 college business students' learning styles did not change over a three year period. In addition, according to Pintrich and Johnson (1990) learners have complete control of their learning style, but their learning strategy can be modified by interventions. Levin (1986) and Weinstein & Underwood (1985) found that the interventions should emphasize different strategies for different tasks and a "match" between the student and the learning style. If the predominant learning style is individual, such interventions include individual writing assignments such as writing abstracts, self paced computer instruction software applications, and in class written essays (Henderson & Conrath, 1991).

In assessing the age ranges of college students in Effective Living Health courses on the highest reported percentage score of preferred learning styles, the age ranges of 35-40 and 23-28 exhibited the highest percentage scores as visual (55.6%) and bodily-kinesthetic (47.2%) learner respectively. These results are somewhat in agreement with the study of adult learners by Galbraith and James (1984). They found that adult learners between the ages of 20 and 49 are predominantly visual and kinesthetic learners.

When assessing the highest percentage score of preferred learning style of gender both exhibited very little percentage score difference as visual learners (male = 31.5% and

female = 32%). The results are similar to the findings of Dunn and Dunn (1979) that

people are 30-40% visual learners. When the preferred learning style, bodily-kinesthetic,

was assessed, results showed that both males and females exhibited a high percentage

score (females 53.2% and males 46.8%). These results exceeded the percentages of the

results found by Dunn and Dunn (1979) of the preferred learning style kinesthetic for adult

students.

In the assessment of sequential learning between male and female college students

in Effective Living Health courses, females presented a higher percentage score (42.2%)

than male students (25.2%). These results contradict the findings of Philbin et al. (1995).

In their study, the authors identified a learning style term very similar to sequential

referred to as assimilator. Assimilation is the process of organizing information in logical

step by step fashions and arriving at new answers (Kolb, D. 1981). The results of this

study showed that adult male learners (n=75) had a higher percentage score (86.0%) as

assimilators than the highest percentage score (10.0%) for adult women (n=75). Similar

results were also found in a study of 2,429 undergraduates at selected four year

postsecondary institutions in South Carolina (Matthews, 1995). Matthews found that

female college students (60.3%) have a higher percentage score as sequential learners than

male college students (37.0%).

The results of the present study showed that female college students exhibited a

higher preference percentage score (60.0%) as individual learners than male college

students (25.0%) who were enrolled in Effective Living Health courses. Conversely,

results from the same study revealed that male college students exhibited a higher

preference percentage score (75.0%) as group learners than female college students (20.0%). In a study by Matthews, (1995) the results showed similar findings that male college students revealed a higher preferred percentage score (53.3%) as a group learner than females (46.7%) and female college students revealed a higher preferred percentage sore (66.3%) as an individual learner than the males (33.7%).

In analyzing the results of preferred learning style of academic majors, the undergraduates in the College of Business and Basic and Applied Science jointly exhibited the highest percentage score (37.0%) of preferred learning style as a visual learners. This result is consistent with the overall preferred learning styles of learners as shown by Dunn and Dunn (1979). The highest preferred percentage score (45.0%) for the bodily-kinesthetic preferred learning style was exhibited by majors who were housed in the College of Basic and Applied Science, which includes basic science and engineering technology majors. In a similar study of 243 undergraduates, results showed that engineering students also revealed a high percentage score (90.0%) as kinesthetic learners (Richards & Zhang, 1997). Engineering and science students require many "hands-on" assignments throughout their academic study. This requirement may suggest why their preferred learning style is bodily-kinesthetic. However, Cornett (1983) notes that math and science majors tend to learn best through sequential learning. Cornett believes this notion, because when conducting experiments and/or mathematical problems, students must follow a distinct and logical method to achieve the solution.

In the present study, undergraduates whose academic majors that are housed in the College of Liberal Arts revealed that written expressive was their preferred learning style

percentage score (40.0%). Results of the present study contradict the findings of Richards and Zhang (1997), who found that liberal art majors exhibited auditory learning as their preferred learning style.

In other results, teacher education majors that are housed in the College of Education exhibited the highest percentage score as group learners as well as oral expressive learners among their preferred learning style. The same results were also found by Heikkinen, Pettigrew, and Zakrajsek (1985) who assessed the learning styles of 149 undergraduates in junior level teacher education methods courses. They found that education majors preferred learning style is oral expressive and group learning. They believed that since future teachers are required to submit many verbal practice lessons in teacher preparatory classes, this may foster the teacher education majors to have a preferred learning style for oral expressive learning. However, this does not imply that every academic discipline in teacher education has a "high preference" for oral expressive and group learning. For example, in the study by Pettigrew and Zakrajsek (1985), which assessed the learning style profiles of 104 physical education majors at the University of Idaho, it was found that their preferred learning style was kinesthetic, or to learn best through " hands on" experiences.

Summary

This research provides both information and implications in regard to learning styles about the students who enrolled into a core curriculum physical education introductory Effective Living Health course at Middle Tennessee State University. The

findings from this study have professionally delineated implications for future instructors of Effective Living Health course in the department of physical education at MTSU.

The first implication is that it is urgent that universities that require core curriculum physical education classes, recognize, accept, and understand diversity in regard to learner typologies. Throughout this study, gender, academic major, and age preferred learning style differences were found. Acceptance of learning style as a fundamental strength of each person contributed to the development of self-esteem, decreased test anxiety, and ultimately enhanced academic achievement (Ault, 1986; Sulivan, 1993; Nelson et al. 1993; Lenehan et al. 1994; Knapp, 1991). When students have feelings of accomplishment and satisfaction, attitudes are more nearly positive, achievement is higher, and dropout rates are lower (Charkins, Toole, & Wetzel, 1985).

The second implication of this study reveals that the majority of the students are visual and bodily-kinesthetic learners. Given this finding, instructors of Effective Living Health courses should deliver the majority of their teaching techniques that assist the needs of the visual and kinesthetic learners in the classroom. Silverman (1989) found that visual learners remember what they see and forget what they hear. Therefore, Silverman recommends showing the students a "tangible meaning" (p.17). Silverman recommends writing directions to assignments on the board, on overheads, or on paper. Silverman also added that visual students are not step-by-step learners, so the need to give them the "big picture" first is essential. Tell the goal of instruction and let them figure out their own method of deriving the answer.

Assisting students that utilize kinesthetic as their preferred learning style, Simeone (1995) suggested the most difficult problem is that kinesthetic learners have difficulty in bridging the gap between conceptual concepts. For example, in an effective living course the instructor was attempting to describe the blood flow of the heart. The instructor could have had the students pretend they were cars on an interstate and the students could drive their fictitious cars through a maze in the classroom pretending blood is passing through arteries and veins. However, what teaching methods should instructors employ for students who are different than visual and kinesthetic learners? Initially, the instructor should assess the preferred learning style of their students at the beginning of the semester. Employing such a measure will assist the instructor when planning his/her lessons to successfully meet the students preferred learning style.

In addition to identifying the preferred learning style, the student may not understand how to utilize other preferred learning styles which the student has identified. To master this; instructors need to teach the students their learning styles, and to do so helps students understand independently their own preferential learning style strengths and weaknesses. Derry and Murphy (1986) indicated that a major objective is to teach students how to learn and manage and monitor their selection and use of various learning strategies based on their learning style. Dunn et al. (1990) provided a homework prescription to college students based on their preferred learning style. They concluded that marginal and underachieving students were unaware of their learning style strengths and when taught how to use them, evidence showed statistically higher academic

achievement on test scores as compared to a control group that was not given a homework prescription.

The third implication is that it is necessary that instructors fluently use a variety of teaching techniques, especially cooperative learning strategies (group learning). The traditional lecture and independent project may only fit the learning style of a few. The research showed from the study that 64% of the students preferred group learning. Males and females both revealed an equal preferred percentage score as group learners at 50% plus.

The fourth implication is that administrators should offer seminars on learning style to instructors who teach Effective Living Health courses. Each year, new graduate teaching assistants, athletic coaches, and adjunct faculty enter the classroom with little pedagogical experience. With such limited experience in teaching, educational seminars on learning style would assist the pedagogical efforts of such instructors to better meet the learning characteristics of the students.

Recommendations

The recommendations from this study is the need for further research on learning styles of students enrolled in Effective Living Health courses. Such studies would include:

1. Comparing the relationship between the learning styles of the students and the teaching styles of the instructors and how this relationship affects course grades.

2. If providing students in Effective Living Health courses a homework prescription based on their preferred learning style, would decrease test anxiety.

3. Relating the socioeconomic background and parental education of students in an Effective Living Health course to their preferred learning style.

4. Replicating this study to assess the students' ability to accurately define their preferred learning style in a test-retest reliability study.

5. Replicating this study to revise the questions on the auditory and global sub-scale to increase the reliability correlation coefficient alpha level.

6. Comparing the preferred learning style of this study to other core curriculum physical education courses.

7. Assessing the preferred learning of students enrolled in Effective Living Health courses with other learning style instruments comparing the results of the present study.

Conclusion

In conclusion, the results of this study indicate that the preferred learning styles of students who enroll in Effective Living Health courses are primarily visual, kinesthetic, and individual, while other preferred learning styles vary in degree of use. To reinforce the preferred learning style of students enrolled in Effective Living Health courses certain pedagogical strategies are necessary so the students' instructional needs are fulfilled. Visual learners better understand information when disseminated through pictures, videos, and instructions written on the board since these learners do not favor oral explanation. Kinesthetic learners comprehend information better doing or being involved with objects to be handled. The group learner identifies with the information better when they are stimulated by others than thinking on their own. Individual learners require ample mount of time to think and reflect on their own. They prefer not to work in groups because they

are usually shy, quiet, and/or withdrawn. Based on the results of this study, Effective Living Health course instructors should arrange their lessons according to the suggested learning method of how visual, kinesthetic, and individual, learners prefer to learn. However, inexperienced instructors who will teach Effective Living Health courses will require the knowledge base to deliver the essential and necessary teaching strategy that will reinforce the students preferred learning style. Providing seminars on how to fulfill the learning needs of the student would be beneficial to novice instructors of core curriculum courses. In addition to providing learning style seminars to inexperienced instructors, experienced faculty would benefit from such information as a "retooling" of their pedagogical skills. Furthermore, such knowledge would encourage a continuous pluralistic approach to teaching towards students preferred learning style in all courses and emphasize teaching methods that challenge and expand learner characteristics.

Health, Physical Education, Recreation, and Safety /// MTSU

P.O. Box 96
Middle Tennessee State University
Murfreesboro, Tennessee 37132
Office: (615) 898-2811

Appendix A

To: Jeff Bonacci and Dr. Doug Winbom
            Department of HPERS
            MTSU Box 96

From: Timothy J. Michael
            College of Education Representative,
            Institutional Review Board- Chair

Re: "Assessment of the preferred learning styles of
            undergraduates enrolled in a core curriculum Introductory
            Health Course
            (IRB Protocol Number: 98-172)

Date: March 24, 1998

The above named human subjects research proposal has been reviewed and
approved. This approval is for one year only. Should the project extend beyond
one year or should you decide to change the research protocol in any way you
must submit a memo describing the proposed changes or reasons for extension to
your college's IRB representative for review. Best of luck in the successful
completion of your research.

A Tennessee Board of Regents Institution
MTSU is an equal opportunity, non-racially identifiable, educational institution that does not discriminate against individuals with disabilities.

Appendix B

Dear Course Instructor:

I hope this semester is going well for you and your class. I am requesting your assistance to participate in my doctoral dissertation on identifying the preferred learning styles of students enrolled in your effective living health class.

I am requesting to administer the questionnaire during your class. We plan to start collecting data when the study has been approved by the MTSU Institutional Review Board. I will be administering the questionnaire personally. The test administration will take approximately 20 minutes.

The instrument that we will be using is the Computerized Assessment of Preferred Styles of Learning (CAPSOL). The CAPSOL identifies the preferred learning styles (visual, auditory, bodily kinesthetic, individual learner, oral learner, group learner, written expressive, sequential, and global learner) of students.

For your information, a copy of the instrument is attached to this letter. Benefits to your students will include an individual learning style profile, which will be distributed immediately completing administration of the CAPSOL questionnaire.

If have you any questions concerning our request do not hesitate to contact me Jeff at 615-896-8004 or e-mail: p_e70001@frank.mtsu.edu. If you agree to participate in this study, please sign you name at the bottom of this letter and indicate the most convenient time to administer the survey. If we have not heard from you within five days of the distributing this letter, I will contact you to assess your status to participate in this study.

Thank you for your time and consideration in assisting us in my education.

Sincerely:

Jeff Bonacci

Signature of instructor _____

Most convenient date and time to administer survey _____

Appendix C

CAPSOL© Style of Learning Assessment

By: John M. Conrath, Ph.D.

Name _____   School _____   Grade _____

	Most Like Me 4	A Lot Like Me 3	A Little Like Me 2	Not Like Me 1
(Please circle the answer which best describes you)				

1. I remember what I read better than what I hear — 4 3 2 1
2. I learn better if someone reads a book to me than if I read silently to myself. — 4 3 2 1
3. When I make a project for my studies, it helps me remember what I have learned. — 4 3 2 1
4. I get more work done when I work alone. — 4 3 2 1
5. When I really have a lot of studying to do I like to work with 3 or 4 friends. — 4 3 2 1
6. I can say the answer to a question better than I can write it — 4 3 2 1
7. Assignments which I write are easy for me to do — 4 3 2 1
8. I like to follow step by step directions. — 4 3 2 1
9. I like to draw pictures. — 4 3 2 1
10. I learn a math problem that is written down better than one I hear. — 4 3 2 1
11. When I do math problems, I say the numbers to myself. — 4 3 2 1
12. I learn best by building, baking or doing things — 4 3 2 1
13. I like to work by myself — 4 3 2 1
14. I like to learn in a group because I learn from others in my group — 4 3 2 1
15. I would rather tell how something works than write how it works — 4 3 2 1
16. I like doing written assignments — 4 3 2 1
17. I like to organize my school work — 4 3 2 1
18. I like to daydream — 4 3 2 1
19. I would rather read a story than listen to a story — 4 3 2 1
20. I remember things I hear better than things I read — 4 3 2 1
21. I like to do things with my hands, like fixing things — 4 3 2 1

22. I learn best when I study alone — 4 3 2 1
23. I get more work done when I work with someone. — 4 3 2 1
24. I think I talk smarter than I write — 4 3 2 1
25. The things I write on paper sound better than when I say them — 4 3 2 1
26. I usually have a place for everything — 4 3 2 1
27. I like to work on many things at one time — 4 3 2 1
28. I remember instructions best when I read them. — 4 3 2 1
29. Saying the addition tables over and over helps me remember them better than writing them over and over. — 4 3 2 1
30. I like to make things with my hands. — 4 3 2 1
31. I study best when no one is around to talk or listen to — 4 3 2 1
32. I can learn more working with a group of my classmates than I can working by myself. — 4 3 2 1
33. I would rather tell about my homework than write it out. — 4 3 2 1
34. I would rather write the answers to a test than tell the answers to the teacher. — 4 3 2 1
35. I make lists for things I have to do. — 4 3 2 1
36. I often have trouble finishing things I am supposed to do. — 4 3 2 1
37. I do well in classes where most of the information has to be read — 4 3 2 1
38. I understand more from talking about a subject in class than from reading about it — 4 3 2 1
39. I understand what I have learned when I make something for the subject — 4 3 2 1
40. I can't think as well when I work with someone else as when I work alone — 4 3 2 1
41. I like to study with other people — 4 3 2 1
42. I would rather tell a story than write it — 4 3 2 1
43. The things I write on paper sound better than when I say them — 4 3 2 1
44. I work on one thing until it is finished — 4 3 2 1
45. I like to create my own way of doing things — 4 3 2 1

DIRECTIONS: Read each question. Circle the four (4) if the question describes you exactly. Circle the one (1) if it is not like you at all. Circle the two (2) if it is like you a little and three (3) if it is like you a lot. To score, tear off this sheet when finished

(800) 772-7809

Appendix D

Consent Form

Cover Letter

Assessment of the Preferred Learning Styles of Undergraduates enrolled in a Core Curriculum Introductory Health Course

Dear Student:

Thank you for taking the time to assist me with my doctoral dissertation research. The questionnaire that you are about to complete measures your preferred learning style (visual, auditory, bodily kinesthetic, individual learner, oral learner, group learner, written expressive, sequential, and global learner). Collectively, this information will benefit teachers of effective living classes of how to disseminate the course content more appropriately to the way students prefer to learn.

Your assistance in this project is completely voluntary and if you prefer not to participate, their will be no effect of the grade you earn in the effective living course or loss of any benefit. You may stop at anytime during the survey and skip a question if you are not comfortable with the nature of the question.

The results of this research project may be published but your or [sic] identity will not be revealed since all the surveys used in the data collection will be anonymous.

By returning this questionnaire you are giving your consent to use this information in Jeff Bonacci's doctoral dissertation and any other further possible publications.

Thank you

Jeff Bonacci

Appendix E

Verbal Instructions Given to Subjects in Effective Living Health Courses when administering the CAPSOL preferred learning style questionnaire

The following instructions will be given orally to the subjects just before they start the CAPSOL questionnaire:

Hi, my name is Jeff

      I would like to thank _____ for allowing me to come to your
                                   instructor of class
      class and administer this learning style questionnaire.

Agreeing to participate in this study is strictly voluntary and will not affect your grade if you decide not to participate.

If you are willing to participate, I will ask you to read the enclosed cover letter agreeing to participate in the study.

Pass out cover letter and collect

As subjects turn in the cover letter, the CAPSOL instrument, scantron answer sheet, academic code sheet, and a number 2 lead pencil will given to each subject, but will be instructed not write until told to do so.

In the area of the scantron sheet marked **SPECIAL CODES**, record your academic major in columns K and L. Use the attached academic major sheet to record the correct code number that corresponds to your major. If you cannot locate your academic major, please let me know at this time.

At this point, start with question number 1 from the CAPSOL learning style instrument continuing on through question number 45. As you read the questions, please answer as honest as possible and record the first answer that comes to mind.

Before the subjects begin to answer the questions on the CAPSOL questionnaire, they will be directed to an illustration on the over head projector and/or blackboard on how to correctly respond to the questions.

Illustration:

A	B	C	D
Most like me	**A lot like me**	**A little like me**	**Not like me**
① 1	② 2	③ 3	④ 4

Before you start answering the questions, please look at the illustrated example. All answers are to be recorded on the scantron NOT on the CAPSOL test. When you begin reading question # 1 on the CAPSOL questionnaire record all your answers on the scantron sheet that corresponds to scale on the CAPSOL questionnaire.

Once you have finished question number 45 on the CAPSOL questionnaire, please continue to answer the demographic data from the questions on the attached form starting with question 46 on the scantron sheet.

You may begin.

References

"To Secure the Blessings of Liberty": Text of Report on State Colleges' Role. (1986) Chronicle of Higher Education, 33(11), 29-36.

Ault, K. (1986). Improving college teaching through adapting learning styles theory into practice. Paper presented at the annual meeting of the Midwest Regional Conference on English in the Two-Year College, St. Louis, MO: (ERIC Document Reproduction Service No. ED 272 494).

Belenky, M., Clinchy, B., Goldberg, N.,Tarule, J. (1986). Women's ways of knowing. (1st ed.). New York: Basic Books.

Bloom, B. S., Hastings, J. T., Madaus, G. F. (1971). Handbook on formative and summative evaluation of student learning. (1st ed.). New York: McGraw-Hill.

Bonacci, J. A., Renaud, L. An investigation of the test-retest and internal consistency reliability of the computerized assessment program styles of learning (CAPSOL) inventory. Unpublished manuscript, Middle Tennessee State University, Murfreesboro,TN.

Bower, G. H.,Hilgard, E. R. (1981). Thorndikes Connectionism, Theories of Learning. (pp. 21-48). Englewood Cliffs, N.J. Prentice Hall.

Carroll, J. B. (1963). A model of school learning. Teachers College Record, 64, 723-733.

Cayne, B. S. (1993). New Webster's Dictionary and Thesaurus of the English Language. (2nd ed.). Danbury, CT: Lexicon Publications.

Charkins, R. J., O'Toole, D. M.,Wetzel, J. N. (1985). Linking teacher and learning styles with students' achievement and attitude. Journal of Economic Education, (16), 111-120.

Coolidge-Parker, J. A. (1989). A comparison of perceived and objectively measured perceptual learning style modality elements of court reporters and court reporting students. (Doctoral dissertation, University of South Florida, 1989) Dissertation Abstracts International 50 07A.

Cornett, C. E. (1983). What should you know about teaching and learning styles Fastback 191. Bloomington, IN. Phi Delta Kappa Education Foundation (ERIC Documentation Reproduction Service No. ED 228 235).

Curry, L. (1987). Integrating concepts of cognitive learning style: A review with attention to psychometric standards. Ottawa, Ontario: Canadian College of Health Sciences.

De Bello, T. C. (1990). Comparison of eleven major learning styles models: variables, appropriate populations, validity of instrumentation, and the research behind them. Reading, Writing, and Learning Disabilities, 6, 203-222.

Dempsey, J. V., Lucassen, B. A., Haynes, L. L.,Casey, S. M. Instructional Applications of Computer Games. (1996). New York, NY: Paper presented at the Annual Meeting of the American Educational Research Association. (ERIC Document Reproduction Service No. ED 346 082).

Derry, J. J., Murphy, D. A. (1986). Designing systems that train ability: from theory to practice. Review of Educational Research, 56, 304-309.

Dunn, K., Dunn, R. (1979). Learning styles/teaching style: should they...can they...be matched? Educational Leadership, 36, 238-244.

Dunn, R., Deckinger, E. L., Whithers, P., Katzenstein, H. (1990). Should college students be taught how to do homework? Illinois School Research and Development Journal, 26(2), 96-113.

Dunn, R. (1984). Learning style: State of the scene. Theory into Practice, (23), 20-25.

Dunn, R., Dunn, K. (1978). Teaching students through their individual learning style. Englewood Cliffs, NJ. Prentice Hall.

Ebert, E. S. (1994). The cognitive spiral: creative thinking and cognitive processing. Journal of Creative Behavior, 28(4), 275-290.

Eggen, P., Kauchak, D., Harder, R. (1979). Strategies for teachers: Information processing models in the classroom. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Fischer, B. B., Fischer, L. (1979). Styles in teaching and learning. Educational Leadership, 36(4), 234-236.

Galbraith, M. W., James, W. B. (1984). Assessment of dominant perceptual learning styles of older adults. Educational Gerontology, 10, 449-457.

Galbraith, M. W., James, W. B. (1987). The relationship of educational level and perceptual learning styles. Mountain Plains Adult Education Association Journal of Adult Education, 15(2), 27-35.

Geiger, M. A., Pinto, J. K. (1991). Changes in learning style preference during a three-year longitudinal study. Psychological Reports, 69, 755-762.

Ginter, E. J., Scalise, J., Brown, S.,Ripley, W. (1989). Perceptual learning styles: their link to academic performance, sex, age, and academic standing. Perceptual and Motor Skills, 68, 1091-1094.

Glasser, W. (1990). Control Theory and Motivation. Quality school managing students without coercion. (pp. 44-45). New York: Harper & Row.

Glasser, W. (1998a). What is reality therapy, Retrieved March 30, 1998. form the the World Wide Web: http://indigo/~irti/whatis.htm

Glasser W. (1998b). Biographical data, retrieved March 30, 1998. from the World Wide Web: http://www.edu.drake.edu/ext/etc/bio.html

Glasser W. (1998c). What is CHOICE THEORY? retrieved March 30, 1998. from the World Wide Web: http://www.wglaserinst.com/whatisct.htm

Gregorc, A. F. (1979). Learning/teaching styles: potent forces behind them. Educational Leadership, 36(4), 245-254.

Guild, P. B., Gulkus, S. P. (1985). Marching to different drummers: a brief history of style (pp. 2-93). Association for Supervision and Curriculum Develpment. (ERIC Document Reproduction Service No. ED 269 839).

Hanson, R. (1996). Instruction that addresses the needs of the individual learner while simultaneously honoring and teaching to the diversity of all learning styles. New Orleans, LA: Paper presented at the Annual Conference and Exhibit of the Association for Supervision and Curriculum Development. (ERIC Document Reproduction Service No. ED 404 018).

Heikkinen, M., Pettigrew, F., Zakrajsek, D. (1985). Learning styles vs. teaching styles - studying the relationship. NASSP Bulletin, 69(478), 80-85.

Henderson, H., Conrath, J. (1991). CAP-WARE, the fast affordable teaching aid for student assessment. Mansfield, Ohio. Process Associates.

Henson, K. T., Borthwick, P. (1984). Matching styles: a historical look. Theory into Practice, 23(1), 3-8.

Hergenhahn, B. R. (1988). Predominantly Cognitive Theories. An introduction to theories of learning. (pp. 284-285). Englewood Cliffs, New Jersey: Prentice Hall.

Hill, J. S. (1976). Cognitive style interest inventory. 2480 Opdyke Road, Bloomfield Hills, MI 48013: Oakland Community College.

Hill, J. S. (1979). SRI student perciever interview. Student learning styles: diagnosing and prescribing programs. (pp. 65-74). Reston, VA: National Association of Secondary School Principles.

Jacobs, L. C.,Chase, C. I. (1992). Planning the test. Developing and Using Tests Effectively. (pp. 16-31). San Francisco, Jossey-Bass.

Keefe, J. W. (1982). Student learning styles and brain behavior. Reston, VA: National Association of Secondary School Principles.

Keefe, J. W., Monk, J. S. (1982). Learning style profile examiners' manual. Reston, VA: National Association of Secondary School Principles. (pp. 20-30).

Kirby, P. Cognitive style, learning style, and transfer of skill aquisition. Information series no. 195. (1979). The Ohio State University: National Center for Research in Vocational Education, Columbus, Ohio. (ERIC Document Reproduction Service No. ED 186 685).

Knapp, B. N. (1991). An investigation of the impact of learning style factors on college student's retention and achievement. Unpublished doctoral dissertation, St. John's University, Jamaica, NY.

Kolb, D. (1981). Experiental learning and theory and the learning style inventory: A reply to Friedman and Stumpf. Academy of Mangement Review, 6(2), 289-296.

Kolb, D. (1984). Experiential learning: Experience as the source of learning and development. Englewood Cliffs, NJ: Prentice-Hall.

Lenehan, M., Dunn, R., Ingham, J., Singer, J., Murray, J. B. (1994). Effects of learning-style intervention on college students' achievement, anxiety, and curiosity. Journal of College Student Development, 35, 1-6.

Levin, J. R. (1986). Four cognitive principles of learning-strategy instruction. Educational Psychologist, 1&2(21), 3-17.

Marshall, J. C., Merritt, S. L. (1986). Reliability and construct validity of the learning style questionnaire. Educational and Pyschological Measurement, 18(1), 257-262.

Matthews, D. An investigation of the learning styles of students at selected postsecondary and secondary institutions in south carolina. (1995). South Carolina State University, Orangeburg: Department of Agricultre, Washington, D.C. (ERIC Document Reproduction Service No. 386 098).

MTSU - Admissions Department Middle Tennessee State University, University Catalog. (1995). Murfreesboro, TN. University Publication Graphics.

Nelson, B., Dunn, R., Griggs, S., Primavera, L., Fitzpatrick, M., Bacilious, Z. F., Miller, R. (1993). Effects of learning style intervention on college student's retention and achievement. Journal of College Student Development, 34(5), 364-369.

O'neil, J. (1990). Making sense of style. Educational Leadership, 48(2), 201-243.

Neuhoff, J. (1998). Cognitive process and performance. Retrieved March 22, 1998 from the World Wide Webb: http://www.Lafayette.edu/~neuhoffj/hfnotes/6/index.htm

Palmer, E. ,H. (1985). Deuteronomy. In K. Barker (Ed.), The NIV Study Bible New International Version. pp. 254 Grand Rapids, Michigan: Zondervan Bible Publishers.

Perrin, J. (1983). Learning style inventory: Primary version, manual for interpretation and administration and teaching suggestions. St. John's University, Jamaica, New York: The Center for the Study of Learning and Teaching Styles.

Pettigrew, F., Zakrajsek, D. (1984). A profile of learning style preferences among physical education majors. Physical Educator, 41(2), 85-89.

Philbin, M., Meier, E., Huffman, S., Boverie, P. (1995). A survey of gender and learning styles. Sex Roles: A Journal of Research, 32(7-8), 485-495.

Pintrich, P. R., Johnson, G. R. (1990). Assessing and improving students' learning styles. New directions for teaching and learning, 42, 83-92.

Price, G. E. (1987). Changes in learning style for a random sample of individuals ages 18 and older who respond to the productivity environmental preference survey. Paper presented at the Annual Convention of the American Association on Counseling and Development, New Orleans, (ERIC Document Reproduction Service No. ED 283 112).

Price, G. E., Dunn, K., Dunn, R. (1996). Productivity enviromental preference survey, PEPS manual. (4th ed.). Lawrence, KS: Price Systems Inc.

Richards, R. S., Zhang, S., (1997). Learning thinking style inventory: LISREL and multivariate analyis. Paper presented at the Annual meeting, American Educational Research Association. Chicogo, Ill. (ERIC Document Reproduction Service No. 410 064).

Rosenshine, B. (1995). Advances in Research on Instruction. The Journal of Educational Research, 88(5), 262-268.

Schmeck, R. R., Ribich, F. D., Ramanaiah, N. (1977). Development of a self-reported inventory for assisting individual differences in learning processes. Applied Psychology Measurement, 1(3), 413-431.

Schmidt, R. A. (1991). Motor learning & performance from principles to practice. Champaign, IL: Human Kinetics Books.

Silverman, L. (1989). The visual-spatial learner. Preventing School Failure, 34(1), 15-20.

Simeone, W. E. (1995). Accommodating Multiple Intelligences in the English Classroom. English Journal, , 60-62.

Sulivan, M. (1993). A meta-analysis of experimental research studies based on the Dunn and Dunn learning style model and its relationship to academic achievement and performance. Unpublished doctoral dissertation, St. John's University, Jamaica, New York.

Swenson, L. C. (1980). Theories of traditional learning perspectives/contemporary development. Belmont, Calif: Wadsworth Publishing.

Tyler, L. E. (1965). The psychology of human differences. (3rd ed.). New York: Appelton-Century-Crofts.
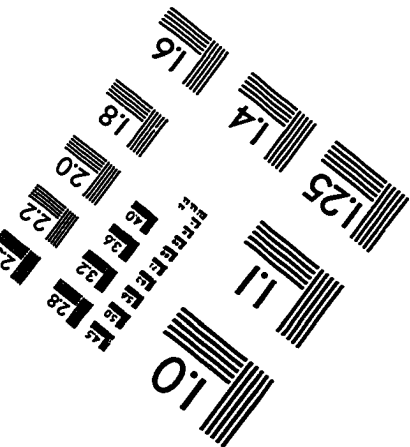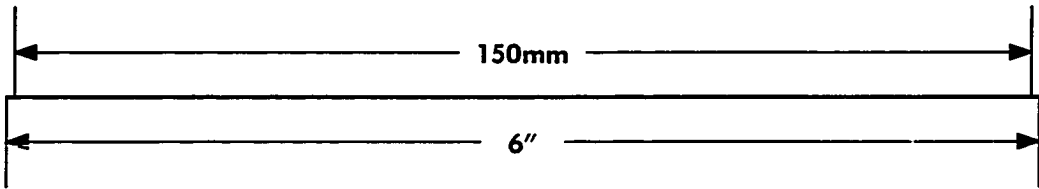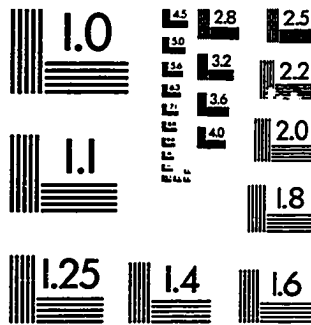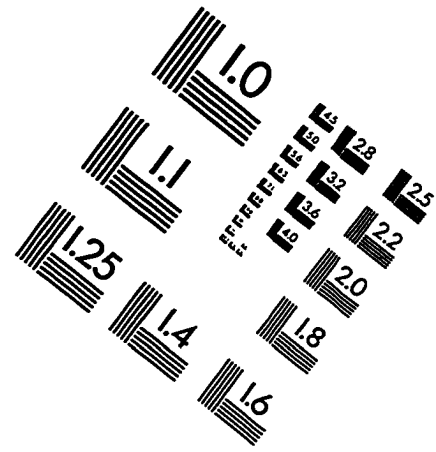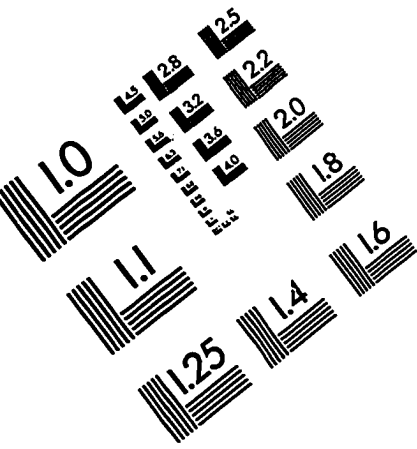
Van Wagenen, R. K. (1971). Learning by observation. In Anonymous, The encyclopedia of education. (pp. 413-418). USA: Crowell-Collier Education Corporation.

Warner, W. (1984). Cognitive style mapping by the Hill model. In Anonymous, Student learning styles and brain behavior. (pp. 15-18). Reston, VA: National Association of Secondary School Principles.

Waters, H. S. (1982). Memory development in adolescence: Relationships between metamemory, strategy use, and performance. Journal of Experimental Child Psychology, 33, 183-195.

Weinstein, C. E., Underwood, V. L. (1985). Learning strategies: The how of learning. Thinking and learning skills: Relating instruction to research. (pp. 241-258). Hillsdale, NJ: Lawrence Erlbaum Associates.

IMAGE EVALUATION
TEST TARGET (QA-3)

150mm

6"