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THE RELATIONSHIP BETWEEN STUDENT AND FACULTY
LEARNING STYLE CONGRUENCY AND PERCEPTIONS OF THE
CLASSROOM ENVIRONMENT IN COLLEGES OF TEACHER EDUCATION

A Dissertation
Presented to
the Faculty of the
Department of Educational Leadership
and Policy Analysis
East Tennessee State University

In Partial Fulfillment
of the Requirement for the Degree
Doctor of Education

by
Patrick N. Kariuki
May, 1995

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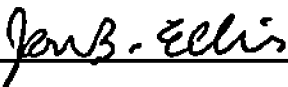
The Committee read and examined his dissertation, supervised his defense of it in oral examination, and decided to recommend that his study be submitted to the Graduate Council and the Associate Vice-President for Research and the Dean of the Graduate school, in partial fulfillment of the requirements for the degree of Doctor of Education in Educational Leadership and Policy Analysis.




Chairman, Graduate Committee



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Signed on behalf of
the Graduate Council



Dean of the Graduate School and
Associate Vice-President for
Research

ABSTRACT

THE RELATIONSHIP BETWEEN STUDENT AND FACULTY LEARNING STYLE CONGRUENCY AND PERCEPTIONS OF THE CLASSROOM ENVIRONMENT IN COLLEGES OF TEACHER EDUCATION

by

Patrick N. Kariuki

The purpose of this study was to determine the extent of congruence between teachers' and undergraduate education majors' learning styles in selected colleges of the Tennessee Association of Colleges for Teacher Education, and to determine if the style congruence was related to student perceptions of the classroom learning environment. A related purpose was to identify needed changes in classroom environments based on the characteristics of the actual and ideal classroom environments as perceived by students, characteristics of the actual classroom environment as perceived by their teachers, and characteristics of actual and ideal classroom environments as perceived by men and women students. A relationship of classroom environments was also examined.

Kolb's Learning Style Inventory and the Adult Classroom Environment Scale were administered to students and teachers in selected colleges for teacher education that were members of the Tennessee Association of Colleges for Teacher Education during the Fall, 1994. Data were analyzed using measures of central tendency and measures of dispersion, t -tests for dependent (correlated) means, t -tests for independent means, and Pearson Product Moment Correlations.

Results indicated that the predominant learning style for both students and teachers was Accommodator. The students preferred Diverger as their second dominant learning style while the teachers preferred Assimilator. The teachers incorporated logical thinking, systematic thinking, and intellectual thinking in their learning behavior, while the students preferred to learn by viewing situations from different points of view and to observe without taking action. Matching students' learning styles with those of teachers was not found to be related to the ratings of the classroom environment. Significant relationships were found to exist between all classroom dimensions except Task Orientation and Student Influence.

Both teachers and students viewed Teacher Support as the most prevalent element of the actual classroom environment and Student Influence as the least noticeable element of the classroom environment. However, the teachers' views for the actual classroom environment were higher than students' views in all subscales except for Organization and Clarity.

INSTITUTIONAL REVIEW BOARD APPROVAL

This is to certify that the following study has been filed and approved by the Institutional Review Board of East Tennessee State University.

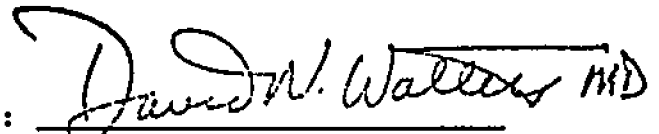
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Institutional Review Board Approval:

A handwritten signature in cursive script that reads "David N. Walters M.D." is written over a horizontal line.

David N. Walters, M.D.
Chairman, IRB

DEDICATION

To my wife, Anne, my sons Samuel, Daniel, and Elijah for their inspiration and support. Also, to my mother Alice Wambugi for her prayers, love, and encouragement.

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I would like to thank my committee chairman, Dr. Russell West, whose continued support, encouragement, and guidance were instrumental in my completion of the dissertation. I also wish to thank the members of my committee: Dr. Don Gresso, Dr. Jon Ellis, and Dr. Marie Hill. Each of my committee members contributed to my professional growth through offering their friendship, constructive criticism, and encouragement.

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CHAPTER 1

Introduction

The classroom environment is a useful construct in predicting academic growth, achievement, and school satisfaction (Galluzi, Kirby & Zuchner, 1987; Moos, 1987; Wright & Cohen, 1982). Ransinki (1990) observed that the classroom was the place where students spend a majority of their days for nine months a year. Therefore, from this perspective, he argued that classroom environment was a vital part of the student's life and should offer opportunities that would facilitate learning.

Emphasizing the importance of the classroom environment, Covington and Omelich (1984) pointed out that different classroom environments and structures elicit qualitatively different motivational goals among students. Along the same lines, Cronbach and Snow (1977) noted that classroom environments and structures may produce differential effects on different segments of the student population.

While a positive classroom environment is an important factor in predicting the students' academic growth and achievement, research indicates that it is influenced by several factors (Fraser & O'Brien, 1985). According to Smith and Renzulli (1990), matching teaching methods to learning style preferences helps to eliminate barriers to learning which arise when individuals fail to address the

affective responses various teaching modalities elicit from students. Additionally, the researchers contended that maximizing the congruence of learning styles results in an improved classroom environment.

Dunn (1990) reported that in classes where teachers and students learning styles were matched, more manageable classes resulted, students received higher grades and were generally more satisfied with the classroom environment.

Another factor that influences classroom environment, as reported by Moos (1987), is the extent to which students perceive supportive relationships between themselves and the teacher. Additionally, supportive relationships promote students' morale, interest in the subject matter, and a sense of academic self-efficacy (Fraser, 1987).

Johnson and Johnson (1988) identified the communication style used by the classroom teacher as another factor influencing classroom environment. They asserted that teachers should recognize that students have different learning styles and, therefore, teachers' communication should be geared towards enhancing students' learning styles.

In a similar study, Friedman and Alley (1984) contended that when teachers' and students' learning styles were congruent, communication was easy and teachers found it easier to work effectively with students. Additionally, students felt that their individual needs were met, and

perceived teachers as more friendly and caring.

Though there are other factors that influence classroom environment, Walberg (1984) summarized research in the area of classroom environment by stating, "the psychological morale or climate of the classroom group - - strongly predicts-end-of -course measures of affective, behavioral, and cognitive" (Walberg, 1984, p. 128).

Walberg further argued that the psychological morale of the students is an important aspect of a classroom environment, and the teacher should endeavor to enhance it. In order to enhance the psychological morale of the students and to increase their performance, motivation to learning, and their attitude toward school, Hill (1992) suggested that teachers should use teaching techniques that accommodate individual learning styles.

Emphasizing the individuality of a student, Dunn, Beaudry and Klavas (1989) indicated that every student has a learning style which is as individual as a signature, and a knowledge of an individual student's learning style makes it easier for the teacher to organize the classroom to respond to the student's need. However, when teachers do not understand students' learning styles, Sternberg (1990) argued that students perceive the classroom environment as hostile and frustrating.

Campbell (1991) observed that two of the most important components in the learning process are the individuality of

the teacher and the individuality of the student. Those individual differences, however, often interfere with the classroom environment unless teachers attempt to understand the implications of learning styles research and incorporate students' learning styles preferences into their teaching style.

Since not all students can match their learning styles with their teacher's style, Cornett (1983) noted that when teachers show an appreciation of the variety of learning styles, they tend to adapt their teaching styles for different situations. However, Henson and Borthwick (1984) found that given the needed time and the correct match between teacher's learning style and student's learning style almost any student can learn or master the materials set before them. From this perspective and the accumulated evidence, classroom teachers need to be congruent with students in their learning styles and be able to accommodate students' learning styles which are different than theirs.

Statement of the Problem

Although researchers have examined learning style identification and methods of accommodating classrooms and materials to meet individual needs, classroom teachers have not utilized the information to the extent suggested by the results of the research (Dunn & Dunn, 1988). Research by McCormick (1988) indicated that when student teachers are not exposed to learning styles in their preparation programs

and efforts are not made to match their learning styles to classroom activities, they have difficulty implementing and using learning styles strategies and research after training. Another reason classroom teachers have not utilized information provided by research on learning styles is that classroom teachers have a perception that they are capable of identifying learning style characteristics of students by observation alone. However, researchers have indicated that it is nearly impossible for even the most conscientious and knowledgeable teacher to know exactly the learning style of his or her students by observation alone (Calo, 1986; Marcus, 1977; and Price, 1977).

Similarly, O'Neill (1990) noted that while the notion of accommodating teachers' and students' learning style congruency enhances the classroom environment, both the advocates and critics of the practice doubt its effectiveness thus hindering the widespread integration of the style-based instruction. As a result of these doubts, Smith and Renzulli (1990) observed that the current situation in most classrooms is that learning style congruences are rarely, if ever, considered in a systematic fashion. These researchers noted that when learning styles congruences are ignored, students become frustrated and perceive classroom environments as hostile. Similarly, when learning styles congruences are ignored, teachers perceive the classroom environment as unfriendly, and find it

difficult to respond to students' needs. At the same time, these researchers suggest lack of consideration of learning style congruences is a significant oversight and may result in an unhealthy classroom environment.

Therefore, the present study will address the problem of relationships between teacher and student learning style congruence, and the way teachers and students perceive the classroom environment in teacher preparation programs.

Purpose of the Study

In light of the above findings, the purpose of this study was to determine the extent of congruence between teachers' and undergraduate education majors' learning styles in selected colleges of the Tennessee Association of Colleges for Teacher Education, and to determine if the style congruence was related to student perceptions of the classroom learning environment. A related purpose was to identify needed changes in classroom environments based on the characteristics of the actual and ideal classroom environments as perceived by students, characteristics of the actual classroom environment as perceived by their teachers, and characteristics of actual and ideal classroom environments as perceived by men and women students. A relationship among classroom environments was also examined.

Significance of the Study

During the 1980s, matching the student's learning style with teacher's instructional style gained strong support and

was endorsed by professional organizations such as the National Association of Secondary School Principals (Keefe, 1987). However, most of this research focused on elementary and secondary school classrooms (Darkenwald, 1987). In addition to the research done in elementary and secondary schools, Darkenwald (1987) provided more information on learning styles and classroom environment by using college adult students in his first study of adult students' classroom environment. Other studies followed Darkenwald's study in establishing relationships between learning styles and college classroom environment (Langenback & Aagaard, 1990; Beer & Darkenwald 1989).

Although a number of significant relationships have been identified between learning styles and their incorporation into various models such as teaching style, student age and gender, current literature suggests that more research is needed to determine the actual impact on classroom environment and learning when teaching methods are congruent with students' learning styles (Marshall, 1990).

Research on learning styles and the perception of the classroom environment in colleges of education teacher preparation programs will provide vital information that will benefit the training of teachers. Rose (1992) noted that when teachers are involved in research pertaining to the dynamics of the classroom environment and learning

styles, they tend to improve their instructional techniques.

This study will add information to the already existing body of knowledge on learning styles and classroom environment in several ways. First, the study will identify learning styles for both teachers and undergraduate students majoring in education at East Tennessee State University as well as other colleges participating in the study. Second, the study will examine the relationship between matched/mismatched students' learning styles and dimensions of the adult classroom environment. Finally, this study will provide some insight for further research.

Limitations

1. This study was limited to selected colleges which are members of the Tennessee Association of Colleges for Teacher Education.
2. Only undergraduate students enrolled as education majors during the Fall of 1994 were surveyed.

Definitions of Terms

To clarify terms which will appear throughout this study, the following operational definitions are adopted:

Student: For the purpose of this study, the term "student" is defined as an undergraduate student majoring in education.

Faculty: This term is used interchangeably with the terms "teacher" or "instructor." Faculty is defined as teachers

or instructors who are involved in teaching the students participating in the study.

Learning Style: Learning styles are behaviors, characteristics, and mannerisms which are symptoms of mental qualities used for gathering data from the environment (Gregorc, 1985).

Learning Style Congruence: This term has often been used interchangeably with the term "learning style match." Learning style congruence is defined as the fit between the preferred learning style of a teacher and a student (Gregorc, 1979).

Cognitive Style: This term has often been used interchangeably with the term "learning style." Cognitive style is defined as "individual variations in modes of perceiving, remembering and thinking or as distinctive ways of apprehending, storing and transforming the information" (Kogan, 1976).

Abstractness: This quality permits an individual to apprehend and perceive that which is invisible and formless to an individual's physical senses of sight, smell, touch, taste and hearing (Gregorc, 1982).

Concreteness: This quality enables an individual to grasp and mentally register data through the direct use and application of physical senses. It also permits an individual to apprehend that which is visible in the concrete physical world through an individual's physical

senses of sight, smell, touch, taste and hearing (Gregorc, 1982).

Classroom environment: The environment of the classroom consists of the characteristics and interactions between students and other students and between students and the teacher. These characteristics include students' active involvement in class activities, encouragement and support from the teacher, completing tasks related to the class, students' achievement of personal goals in relation to the class, the structure of the class as well as clarity of delivery of the subject matter, and the participation of the student in the planning of course topics (Darkenwald, 1989b).

Classroom: According to Darkenwald (1989b), a classroom is an organized group learning situation which includes variables such as the students' prior knowledge, experience, and ability; institutional restraints; support services; and facilities.

Adult Learner: There are varied definitions of the adult learner. Johnstone and Rivera (1965) at the National Opinion Research Center in Chicago defined an adult as "anyone either twenty-one or over, married, or the head of a household" (p. 31). The National Center for Educational Statistics (1974) defined adults in terms of ages 17 and over, while Penland (1979) defined an adult learner as age 18 and over. For the purpose of this study, students aged

18 years and over will be classified as adult learners.

Actual Classroom Environment: According to Darkenwald (1989b), the actual classroom environment is defined as the way in which students view their current classes.

Ideal Classroom Environment: Darkenwald (1989b) defined the ideal classroom environment as the way in which students imagine an ideal class to be.

Overview of the study

This study was organized into five chapters as follows:

Chapter 1 consists of an introduction, a statement of purpose of the study, significance of the study, limitations, definitions and overview of the study.

Chapter 2 was literature review of the study

Chapter 3 was be methods and procedures employed in this study.

Chapter 4 was analysis of data collected in this study.

Chapter 5 was summary, discussion, conclusion and recommendations for future studies.

CHAPTER 2

REVIEW OF THE LITERATURE

Organization of the Chapter

This chapter is divided into three major sections: (1) learning styles theories which have been developed, (2) instruments selected for the study and (3) reflecting on learning styles and classroom environment.

In the first section a brief overview on learning style, definition of learning style, and cognitive learning style is examined. Section two reviews the conceptual and theoretical framework of the Kolb's Learning Style Inventory, and the Adult Classroom Environment Scale. Section three reviews the adult classroom environment and the congruency in learning styles.

Overview of Learning Styles

According to Kirby (1979), learning styles can be classified and identified in many different ways. Generally, they are overall patterns that provide direction for learning and teaching (Cornett, 1983). Learning styles can also be described as a set of factors, behaviors, or attitudes that facilitate learning for an individual in a given situation (Brown & Hayden, 1980). There is no one right way to learn or to teach, but certain styles that are more appropriate for a given situation. Therefore, knowing the student's and teacher's learning style is crucial because learning styles influence how students learn, how

teachers teach and how individuals interact interact (Cornett, 1983).

The director of research for the National Association of Secondary School Principals (NASSP), James Keefe wrote, "learning style diagnosis . . . gives the most powerful leverage yet available to educators to analyze, motivate, and assist students in school. It is the foundation of a truly modern approach to education" (Keefe, 1979, p. 132).

Since the publication of this article, many professional journals have published studies by various practitioners who reported dramatic success with learning styles based instruction (Ballinger & Ballinger, 1982; Cavanaugh, 1981; Dunn, 1981; Fiske, 1981; Hodges, 1982, 1983; Jenkins, 1982; Lemmon, 1982; & Pizzo, 1982).

According to Guild (1980), the term "learning style" was relatively new in the early 1970s but by the end of the decade a significant number of studies and theoretical articles became available. In 1975 a computer search of ERIC for the term "learning styles" yielded less than 50 citations; in 1979, it yielded over 800 citations and in 1989, 13,000 citations were listed.

Since only a percentage of the information available through ERIC and other sources could be employed in this study, the literature review will be confined to those investigations involving college students, although additional studies on other academic levels and areas will

be reviewed when applicable to the study. Similarly, for the purpose of this review, the major emphasis of the research will be for the years 1970 through 1993.

Definition of Learning Styles

The concept of learning style has been defined differently by many researchers. In general terms, learning style refers to an individual's unique way of interacting with the environment. It is a hypothetical construct that is intended to help explain the learning process. Claxton and Ralston (1978) used the term learning style to refer to a "student's consistent way of responding to and using stimuli in the context of learning" (p. 7).

The following are some selected specific definitions.

Gregorc (1985) defined the concept as,

learning styles are behaviors, characteristics, and mannerisms which are symptoms of mental qualities used for gathering data from the environment (p. 192).

Dunn (1986) said,

learning style is the way in which each person absorbs and retains information and/or skills, regardless of how that process is described. It is different for each person (p. 13).

Keefe (1979) suggested that,

learning styles are characterized by cognitive, affective, and physiological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment (p. 4).

Banks (1973) stated that,

learning style is a significant aspect of an individual's capacity to learn. Methods of

evaluation should be developed to assess an individual's learning style (p. 18).

Kolb (1978) proposed that,

individual learning is based on experiential learning model which is cyclical in nature. The four stage cycle includes concrete experience of a learning situation, reflective observation of relevant phenomena, abstract conceptualization about the meaning of what has been observed, and the active testing of hypotheses. The degree to which a person favors particular stages of the cycle indicates the learning style preference of that individual (p.464).

The definitions above reflect each individual researcher's view point, whether it is cognitive or multi-dimensional. However, for the purpose of this research, Kolb's definition for learning style has been adopted.

Cognitive Style

Some researchers have identified three student learning styles which are useful in describing and understanding the performance of students in the classroom. The three styles include the cognitive, affective, and physiological (Cornett, 1983; Guild & Garger, 1985; Keefe, 1982; and Keefe, 1990). For the purpose of this research, only the cognitive style will be addressed.

According to Even (1982), cognitive styles are "the ways in which an individual perceives, gathers, and processes information in order to learn, solve problems, work and relate to others, act in groups or participate in activities" (p. 14). However, Bonham (1988) indicated that there are wide range of definitions of cognitive style, and

that all of them indicate lack of agreement on the basic concept. Nevertheless, despite the lack of agreement on the basic concept of cognitive style, Daniel, Rasmussen, Jackson, and Brenner (1984) noted that the term cognitive style concerns itself with the information processing as a foundation to the process regardless of the definition used. These researchers contend that an individual's ability as well as his or her capacity to process information is influenced by unlimited aspects of information processing.

Individuals view and interact with their world in different ways. An individual's perception of an event may be that of flux, while another may see permanence. Differences perceived by each individual is not only in the ways things are seen but also in what is seen. These differences in cognitive style result in an individual using different channels to acquire and use information for solving problems (Nester & Pulford, 1979).

Keefe (1988) identified cognitive control as the ability to exercise direction and control over specific information processing operations. When cognitive control is combined with other developmental, psychological and environmental preferences, the researcher called it learning style. The researcher further asserted that when an individual understands his or her own learning style, he or she is able to process information more effectively.

Writing on the same lines, Gregorc (1985) contended

that cognition as a primary component of learning style plays a significant role in determining the success of an individual's ability to process information. The researcher further asserted that cognition concerns itself with the various operational phases through which new information passes as the mind decides the best way to represent and to communicate that information.

Effective communication depends on the information processing of messages sent and received by synthesizing it, coding it, storing and retrieving it (Dunn, 1989; Ingham, 1991). These researchers suggested that individuals who have the same cognitive style use similar ways of communicating, thus, facilitating understanding.

When information is received from the external environment through the senses (perception), that information is stored briefly in perceptual memory in order to allow the mind to make a decision regarding the information. The information received may be rejected, memorized for short-term recall, transformed to conform to prior messages, or learned by integrating, assimilating, differentiating or associating it with long-term memory. When this process is completed, it results in a changed cognitive structure for the individual (Witkin, 1973).

Messick (1976) distinguished cognitive style from general abilities in that cognitive style focuses on how one learns while general abilities focus on what one learns.

Messick further stated that cognitive style is bipolar or on a continuum from sequential to global, whereas, abilities are unipolar or measured with a single score such as percentile. Ability scores have a judgment placed on them as to whether they are excellent, average, or poor, whereas, style scores or style characteristics are not right or wrong. However, since cognitive style is composed of various dimensions, Messick suggested that knowledge of these dimensions would enhance the understanding of the cognitive style.

Reiff (1992) identified several cognitive style dimensions which are useful in understanding the cognitive style. These dimensions reflect the way in which one processes experiences and knowledge, how one organizes and retains information, whether one is analytical or global, whether one works quickly or deliberately, and whether one approaches learning and teaching sequentially or randomly. These dimensions include: brain dominance, conceptual tempo, mind styles, modality, multiple intelligence, and psychological.

Brain Research and Learning Style Development

The brain has been compared to a radio, a telephone network, or a computer but, in reality, it is more complex. At birth the individual brain weighs only a pound, and by the end of first year, it gains a second pound. Finally by age 16, the brain gains another pound. However, only a

small portion of the brain's capabilities is used (Grady, 1984).

Paul Broca, in the mid 1800s, proposed the classic hemispheric dominance theory that particular characteristics were associated with each side of the brain. Initially, researchers believed the left side of the brain had the higher faculties and was more dominant. By the late 1800s, John Jackson questioned the brain dominant theory. He considered the right brain to be the "neglected hemisphere" (Springer & Deutsch, 1985).

Brain theory research made tremendous strides during the 1950s when Roger Sperry at the California Institute of Technology was able to sever the corpus callosum, the nerve fibers between the two cerebral hemispheres, and study each of the hemispheres in isolation. After severing the corpus callosum, Sperry continued to work with the animals to demonstrate that their habits remained the same. However, when the severed animals were trained to do some tasks, Sperry found that they had two independent minds with recognition, memory and decision systems. Additional work with epileptic patients had similar results (Levy, 1983).

Sperry's split brain theory or cerebral specialization research established that the two hemispheres of the brain process information differently. Individuals do not learn with only one hemisphere, but there may be a preference for one or the other hemisphere's processing strategies. Both

hemispheres are equally important and need to be considered to reach optimum potential. Characteristics of the left hemisphere include verbal, sequential, and analytical abilities. Dominant functions of the right hemisphere are global, holistic, and visual-spatial. Other controversial characteristics have been associated with each side. In 1981 Sperry received the Nobel Prize for his work (Grady, 1984; Restak, 1984; & Springer & Deutsch, 1985).

In support of Grady and partners, Soares and Soares (1982) research indicated that brain research played an important role in informing the learning process. In his research on the "right-brain left-brain" process, Hoover (1987) found that creative, spatially oriented people may be considered as "right-brained or hemisphered" thinkers. On the other hand, "left-brained or hemisphered" thinkers were found to exhibit analytical or verbal orientation. While a person with a right-hemispheric preference might prefer pictures, a person with a left-hemispheric preference would enjoy reading a paragraph complete with details.

On the same lines, Wittrock (1978) contended that left and right brain processes each make significant contributions to language comprehension. He showed that teaching right-brain imaging can be a powerful means of increasing reading comprehension.

In a similar study on right and left hemispheres, Zenhausern (1982) developed the Differential Hemispheric

Actuation Instrument (DHAI). This instrument contains 26 items which ask an individual to select a preference for a particular activity indicative of spatial or verbal orientation. Zenhausern coined the term "neuroeducation" which indicated that aspect of education which is focused on the interaction of the brain with the behavior of learning methods.

Further research on brain and learning style, using a whole brain approach to education rather than dominance of one hemisphere over the other, revealed that one can use methods of teaching that allows representatives of each dominant hemisphere to stretch into the other hemisphere (Richert, 1988). Similarly, Webb (1983) cautioned that although pure research and medical application thrusts of the brain researchers can be beneficial, one must be very careful when adapting tentative brain hypotheses or special care training techniques into every day classroom strategies. However, when the efforts of the brain researchers are combined with those of learning style researchers, Gregorc (1983) said:

1. The brain is differentiated in function: the two halves process different kinds of information in different ways. The hemispheres appear to "house" specific functions like analytical and synthetic process, imagery and verbal responses, and simultaneous and successive processes in different sections. This supposition supports empirical evidence about the differences in stylistic responses to stimuli.
2. The two halves of the brain are connected and therefore function holistically. Despite

reasonable specialization of the hemispheres, they indeed work together. This, in part, accounts for empirical evidence that people can register at least some information to varying degrees irrespective of the instructional technique. This fact also accounts for the generalized impression that we all learn the same way.

3. Certain environmental stimuli and cultural activities stimulate specific functions more than others. If these functions are well developed in an individual, the responses will be refined and clear. This, however, points to the biases in some of our teaching techniques and raises questions regarding the balancing of our approaches.
4. Brain growth periods may occur in which certain data can be gathered and reinforced better than at other times in human growth and development. This lends credence to the empirical and psychological positions regarding cycles, ages and stages, periods of absorption and reflection, transitions, and crisis periods in human life. (p. 6).

Gregorc further indicated that the parallels above provide strong evidence that individual differences do exist and that some instructional approaches are inappropriate for certain individuals.

Conceptual Tempo (Reflection/impulsive)

Conceptual tempo refers to an individual's consistent tendency to approach problem situations either rapidly or cautiously, with accuracy or inaccuracy. It also relates to the behavior exhibited in the classroom (Kogan, 1976; Kogan & Wallach, 1964; and Lestak, 1978).

The most common instrument for assessing conceptual tempo is the Matching Familiar Figures Test (MFFT) in which a student is shown six similar pictures and a primary picture to match. Two scores result from the instrument:

the time in seconds it takes the student to begin to respond and the error score or number of errors the student makes before choosing the correct picture (Harvard University Press, 1965).

Katz (1971) and Stegelman (1969) noted that impulsive learners are quick to respond, risk takers, easily bored, curious, easily frustrated, distractible, and less able to concentrate. In contrast, the researchers revealed that, whereas, impulsive children work fast to get an answer, reflective children work to avoid errors. Similarly, reflective learners do not want to be wrong or humiliated. They are able to concentrate and analyze; they prefer working on solitary tasks, and are in control of their emotions.

Research by Pratt and Wickens (1983) indicated that neither impulsivity nor reflectivity was superior for all learning tasks. However, reflective children were found to use specific strategies more effectively for particular tasks. For example, reflective children were found to be more successful at detailed visual scanning such as recalling details of a story. They also had more understanding of multiple meanings. But when impulsive children were prompted and aided by the test administrator, the differences decreased (Brodizinsky, 1975).

Further research on reflectivity and impulsivity by Rollins and Genser (1977) found that reflective children were

more successful at inductive reasoning (specific to general). They also found that impulsive children were better at responding to global questions. However, both impulsives and reflectives can respond analytically or globally after reinforcement (Cameron, 1984).

Mamchur (1982) provided educators with some interesting conclusions using the Action Oriented Reflection Oriented (AORO) instrument. He concluded that action oriented students tend to focus toward people and things which surround them, while reflection oriented students focus toward their own private world of ideas.

Field Dependence/Field Independence

Field dependence/field independence dimension is concerned with how people learn and memorize when faced with complex material or situations. Four paper and pencil tests of geometric shapes can be administered to determine field independence/field dependence: (1) the adult Embedded Figures Test; (2) the Preschool Version; (3) the Children's Version (ages 5-16) and (4) the Group Embedded Figures Test. Subjects are shown a simple shape and a complex design within which the simple shape is hidden. The subjects are asked to isolate the simple figure from the complex design (Garger & Guild, 1984).

Herman Witkin, often called "the father of cognitive style," determined that an extremely field dependent individual is dominated by the field or the surrounding area

of the complex figure, has difficulty isolating the hidden figure, and is more global than field independent individual. An extremely field independent person is not distracted by irrelevant background material, can distinguish parts of the whole, is more analytical, and can separate the hidden or embedded figure (Witkin, 1973; Witkin, Moore, Goodenough, & Cox, 1977).

Saracho (1988) argued that although field dependent and field independent people have the same intellectual capacity, differences emerge in individual ability to use information and process material. Some researchers have contended that independent students have more cognitive flexibility than field dependent students. Similarly, they are more flexible in their problem solving approaches and the way they attack new materials. Also, they are more task oriented and able to focus attention on the relevant aspects (Messick & French, 1979; & Saracho, 1988).

On the other hand Saracho (1988) cautioned that teachers should realize the difficulties field dependent students have with particular subjects and instructional methods. Though these students are as capable as their peers, they need different teaching strategies. For example, they respond well to group activities, discussion, cooperative learning, and peer teaching.

According to research conducted by Barthelot (1982) there was evidence that females tend to be more field

dependent than males. Additionally, the researcher felt that students career choices were greatly influenced by teachers and classroom experiences.

Guild and Garger (1985) found that when information about field dependence/field independence was applied to supervisors, teachers, and administrators, field independent teachers had certain expectations from the administrators and supervisors. They expected the administrators and the supervisors to allow independence and flexibility, to focus on tasks, to provide information directly and to maintain a professional atmosphere. However, field dependent teachers were found to prefer supportive administrators and supervisors who provide an open atmosphere by seeking teachers opinions and being interested in them personally.

The following is a summary of the characteristics of field dependent and field independent students:

Field dependent students

1. are global
2. have more difficulty isolating a shape from surrounding area
3. benefit from cooperative learning
4. need strategies to help organize and to comprehend material
5. need teachers to model how to organize information and how to communicate that information
6. have problem with crowded/busy worksheets.

Field independent students

1. are analytical
2. can isolate a shape from surrounding area
3. are more internally motivated
4. have more cognitive flexibility and attitudes
5. like internally independent projects

Modalities

Several researchers agree on the definition of learning modalities as the sensory channels or pathways through which individuals give, receive, and store information (Barbe & Milone, 1980; Barbe & Milone 1981; Barbe & Swassing, 1979). The modality of senses include visual, auditory, tactile, kinesthetic, smell (olfactory), and taste.

The Barbe and Milone (1981) study revealed that in a regular classroom about 20-30 percent of the students are visual, 25-30 percent are auditory, about 15 percent tactile/kinesthetic, and 25-30 percent have mixed modalities. Researchers therefore, concluded that approximately 30 percent of the students will remember most of what is said in a classroom and another 30 percent will remember primarily what is seen.

Usually, visual learners are considered as those who learn by seeing, while auditory learners are those who must hear what they are learning to understand it. Tactile or tactual learners on the other hand need to feel and touch to learn, while kinesthetic learners learn better if movement

is involved. However, the terms tactile and kinesthetic are often used interchangeably (Dunn & Dunn, 1988).

Petreshene (1982) showed that though some students learn with all their modalities, some may have extraordinary strengths and weakness in particular modalities. For example, students strong in the visual modality can be frustrated or confused with only a verbal explanation. On the other hand, students who rely primarily on listening and hearing the sounds have auditory modality strength.

An interesting study by Rosenshine (1971) revealed that many students who do not do well in school are tactile or kinesthetic learners. The researcher further asserted that instruction geared to the auditory learners can be a hinderance to tactile/kinesthetic learners, causing them to fall behind. Once this happens, students begin to lose confidence in themselves and resent school because of repeated failures. Carbo and Hodges (1988) noted that one of the major reasons why at-risk children have trouble with school is that they tend to be tactile/kinesthetic learners.

Battroff (1988) maintained that approximately one third of students do not process auditorially and are educationally deaf. Teaching and learning strategies that use visual and kinesthetic practices need to be provided for these individuals. Students with a tactile strength learn with manipulatives such as electroboards, circle games and task cards.

Along the same lines, Barbe and Swassing (1979) concluded that an effective means to reach all learners was using modality based instruction which consists of --

Modalities and other factors

Age: Although Barbe and Swassing (1979) found that strengths do vary and change with age, research does not agree about which modality is dominant at which age. Barbe and Milone (1981) found that in preschool, children's modalities function independently of one another. However, as the children develop, maturation and experience integrate the modalities. Therefore, more adults than children have mixed modality strengths.

Achievement: Barbe and Swassing (1979) found a significant relationship between the ability to use all learning modalities and achievement. The researchers concluded that the ability to use all learning modalities may significantly affect the acquisition of academic skills. Along the same lines, Milone (1983) noted that although integrated modality learners are no more intelligent than those students with a single modality, they can process information more effectively in whatever modality is presented.

Race: Although culture can influence aspects of an individual's approach to learning, Hale (1986) did not find any relationship between modality strengths and race. However, the researcher cautioned that generalizations should not be made about modalities and race.

Handedness: Research indicates that modality strengths and handedness have no relationship either in right or left handed children or adults (Barbe & Swassing, 1979). From this perspective, Barbe and Milone (1981) concluded that modality strengths are not related to hemispheric dominance and that the opportunity to practice within each modality is the same for right and left handed students.

Gender: Several researchers have agreed that there is no relationship between gender and modality characteristics among children or adults. Similarly, there is no relationship between dominant learning moda (gender, or between gender and the ability to function using each modality (Barbe & Milone, 1981; Milone, 1983; Reiff, 1987).

Despite the revelations cited by several researchers on modalities, controversy still continues as to whether diagnosing of and teaching to the modalities of students is effective or ineffective (Jones, 1990; Kampwarth & Bates, 1980; Carbo, Dunn, & Dunn 1986).

Occasionally, researchers disagree with each other's findings. For example, Dunn and Carbo's (1981) research did not support the findings of Barbe and Milone (1981) that students in primary grades were more auditory than visual and learned least well when taught using kinesthetic modality.

However, researchers frequently agree with each other in their findings. According to Price (1984, 1977),

researchers have found the following to be consistently true:

1. that each student learns differently from his/her peers;
2. that the performance of a student in a particular class or subject area is related to how he/she learns;
3. that when students are taught through their particular area of strength (modality), they perform better; and
4. that the development of a comprehensive learning style inventory or inventories is definitely possible.

Hill (1971) noted that "cognitive style is a unique means for describing an individual's mode of behavior in searching for meaning." According to Grout (1990), Hill attempted to make his theory more scientific by preparing a hierarchy of seven educational sciences. It consisted of the following:

1. Symbols and meanings;
2. Cultural determinants;
3. Modalities of inference;
4. Educational memory (neurological, biological, and electrochemical);
5. Cognitive style;
6. Teaching, administrative, and counseling style;

and

7. Systematic, analytical decision-making.

Hill used this hierarchy in the development of his instrumentation method. Hill (1976) suggested that individuals assimilate data from their environment through their five senses, that they establish at a subliminal level one or a combination of input channels as most productive, and that they develop ways of responding which are consistent with their preferred learning patterns. In Hill's system individuals can acquire meaning from their environment through the senses of hearing (auditory), smell (olfactory), taste (savory), touch (tactile), and sight (visual).

Barbe and Swassing (1979) wrote about these senses (modalities):

A modality is any of the sensory channels through which an individual receives and retains information. A critical component of this definition is the phrase "receives and retains," since it implies that sensory, perception, and memory constitute what we are calling modality. Because these three processes are the essence of learning itself, the modalities can be called the keys to learning. (p. 1)

They viewed modalities in three ways: (1) fixed neurological characteristics, (2) preferences, and (3) measurable behaviors.

Conceptual and Theoretical Framework for Kolb's Learning
Style Inventory

Several researchers indicate that the developmental

theory includes several descriptions of the cognitive growth process (Erikson, 1959; Kohlberg, 1976; Lowinger, 1976; Perry, 1970; Piaget, 1964). These researchers suggest that the individual developmental process can be seen as stages of development and that each stage emphasizes the primary or specific abilities. Kolb utilizes the Jungian (Jung, 1923) concept of styles or types of learning which stresses the idea that adult development is characterized by higher levels of integration. Kolb and Fry (1975) posit three stages of the human growth process: acquisition, specialization, and integration.

The first stage, acquisition, extends from birth to adolescence and marks the acquisition of basic learning abilities and cognitive structures. The second stage, specialization, extends through formal education and/or career training and the early experiences of adulthood in work and personal life. In this stage, development primarily follow paths that accentuate a particular learning style. Individuals shaped by social, educational and organizational socialization forces, develop increased competence in specialized mode of adaptation that enables them to master the particular life tasks they encounter in their chosen career path. This stage usually terminates at mid-career although the specific chronology of the transition to stage three varies widely from person to person and from one career path to another. The third

stage, integration, is marked by the reassertion and expression of the nondominant adaptive modes of learning styles. Means of adapting to the world that have been suppressed and lie fallow in favor of the development of the more highly rewarded dominant learning style now find expression in the form of new career interests, changes in lifestyles, and/or innovation and creativity in one's chosen career (Kolb, 1976).

Each stage is marked by increasing complexity and higher levels of integration. Each is also made evident by the dominance of certain cognitive abilities, with the third stage demonstrating some integration of all the primary abilities. Kolb suggests that individuals respond to their environments by adopting a particular specialized mode of adaptation, or learning styles, which allows them to respond to the demands they encounter. He agrees with the work of Ference Marton (Marton & Saljo, 1976) which suggests that students adapt their learning styles to what is expected of them. Hence, according to Kolb, different academic disciplines demand different learning styles and therefore, students of these disciplines demonstrate significant variations which relate to both their choice of major by discipline, and the subsequent reinforcement through experience in that field.

The conceptualization of cognitive abilities and learning styles by Kolb (1976) grew out of the earlier work

of Kurt Lewin (1976) in social psychology. The experiential learning theory approach places emphasis on the role of experience in the learning process and is described by a learning cycle approach on "how experience is translated into concepts which in turn are used as guides in the choice of new experience" (p. 2).

The Experiential Learning Model (Kolb, 1985, p. 2)

Concrete Experience

Testing implications
of concepts in new
situations

Observations and
reflections

Formation of abstract
concepts and generalization

Kolb (1976) indicates that the four abilities of importance within the dialectical model are: Concrete experience (CE), Reflective Observation (RO), Abstract conceptualization (AC), and Active experimentation (AE). All four are needed by the learner.

Kolb (1985) described these four abilities as follows:

Concrete Experience (CE)

This stage of the learning cycle emphasizes personal involvement with people in everyday situations. In this stage, an individual tends to rely more on his or her feelings than on systematic approaches to problems and situations. In a learning situation, an individual relies

on his or her ability to be open-minded and adaptable to change.

Reflective Observation (RO)

In this stage of the learning style cycle, individuals understand ideas and situations from different points of view. Individuals usually rely on patience, objectivity and careful judgment without necessarily taking any action in a learning situation. A reflective observer usually relies on his or her thoughts and feelings in forming opinions.

Abstract Conceptualization (AC)

In this stage, learning involves the use of logic and ideas, rather than feelings to understand problems or situations. Typically, one relies on systematic planning and developing theories and ideas to solve problems.

Active Experimentation (AE)

Learning in this stage takes the active form of experimenting and influencing or changing situations. Individuals usually choose a practical approach that works instead of merely watching a situation.

Kolb (1985) further states that an individual must be able to involve himself or herself fully, openly and without bias in new experiences from many perspectives (RO).

Similarly, an individual must be able to create concepts that integrate his or her observations into logically sound theories in order to make decision and solve problems.

According to Kolb, formal education enhances an individual's

capability for integrating theories into practice.

Formal education produces both a culture and specialized orientations to learning into which individuals are socialized. According to Kolb (1976), different disciplines show variations among primary tasks, technologies, criteria for truth, academic excellence, methodological strategies, and productivity. Each discipline also holds certain norms that govern personal attitudes, styles and relationships. Therefore, most students develop learning styles within these environmental settings which emphasize some learning abilities over others and which reflect the disciplinary orientation or career path they have selected.

In order for the learner continually to choose which set of abilities to bring to a specific task, Kolb's model asserts that learning should focus on abilities that are polar opposites. He describes two dimensions to the learning process.

- | | | |
|----|--|-------------------------------|
| 1. | Concrete
experiencing of ----->
events | Abstract
Conceptualization |
| 2. | Active
Experimentation -----> | Reflective
Observation |

Kolb's Learning Style Inventory (LSI) measures differences in learning styles along the basic dimensions of abstract-concrete and active-reflective. Several cognitive psychologists (Bruner, 1966; Harvey, Hunt & Schraeder, 1964) emphasize the use of the concrete abstract dimension in

their work. The active-reflective dimension as indicated by Kolb (1976) describes thought as becoming more reflective and internalized as growth occurs.

Over time, Kolb (1976) sees the dialectical tensions between these dimensions as constantly resolved through the socialization process. Through this process of socialization, the conflicts between active and reflective and between immediate and analytical are resolved, and individuals tend toward one of the four basic learning styles. Kolb (1976) identified these basic styles as:

1. **Converger:** Characterized by dominant learning abilities of abstract-conceptualization (AC) and active-experience (AE).
2. **Diverger:** Characterized by dominant learning abilities of concrete-experience (CE) and reflective-observation (RO).
3. **Assimilator:** Characterized by dominant learning abilities of abstract-conceptualization (AC), and reflective-observation (RO).
4. **Accommodator:** Characterized by dominant learning abilities of concrete-experience (CE) and active-experimentation (AE).

Learning Style Inventory

Kolb's Learning Style Inventory was developed to measure the individual learning styles derived from

experiential learning theory. It measures an individual's relative emphasis on the learning abilities of Concrete Experience (CE), Reflective-Observation (RO), Abstract-Conceptualization (AC) and Active-Experimentation (AE). In addition, the inventory provides measurement on two combined scores that indicate the extent to which an individual emphasizes abstractness over concreteness (AC-CE) and the extent to which an individual emphasizes action over reflection (AC-RO) (Kolb, 1976).

According to Rush (1983), Kolb's learning style inventory was determined by three planned objectives. First, the test was designed to be brief and straight forward so that, in addition to research purposes, it could be used as a means of discussing the learning processes with individuals and giving them feedback on their own learning styles. Secondly, the test was constructed in such a way that an individual would respond to it in somewhat the same way as he or she would in a normal learning situation. Third, it was hoped that the test would be valid in that the measures of learning styles would predict behavior in a way that was consistent with the theory.

Kolb collected his data from over 800 subjects, including senior medical students at Boston University, M.I.T. master students in management, M.I.T. Sloan Fellows, and practicing managers from an industrial firm. The results of the investigation identified four learning style

types, which are:

Converger

This type of learning style combines the learning steps of Active-Conceptualization and Active-Experimentation. An individual with this learning style is best at finding practical uses for ideas and theories. The converger's knowledge is organized in such way that, through hypothetical-deductive reasoning, one can focus on specific problems.

Heath's (1970) research in this style of learning shows that convergers are relatively unemotional, preferring to deal with things rather than people. They tend to have narrow interests, and choose to specialize in the physical sciences. Kolb (1976) research indicated that this learning style is characteristic of many engineers.

Diverger

This type of learning style combines learning steps of Concrete-Experimentation and Reflective-Observation. An individual with this type of learning style views concrete situations from many points of view. According to Kolb (1976), the individual's greatest strength lies in his or her imaginative ability. The diverger excels in the generation of ideas, brainstorming, and recognizing problems. Kolb's research indicates that divergers often specialize in the arts and that this style is characteristic of persons with humanities and liberal arts backgrounds.

Counselors, organization development consultants, and personnel managers often have this learning style as well.

Assimilator

This type of learning style combines learning steps of Abstract-Conceptualization and Reflective-Observation. An individual with this learning style is best at understanding a wide range of information and putting it into concise, logical form.

Research shows the assimilator to have strengths in the ability to create theoretical models, to excel in inductive reasoning, and to assimilate disparate observations into an integrated explanation (Grochow, 1974). The style emphasizes abstract concepts over interest in people. Strasmore (1973) states that the precision of a theory is more important than its potential utilitarian value. As a result, this learning style is more characteristic of the basic sciences and mathematics rather than the applied sciences. In organization, this learning style is found most often in research and planning departments (Kolb, 1976).

Accommodator

This type of learning style combines learning steps of Concrete-Experience and Active-Experimentation. An individual with this learning style has the ability to learn primarily from hands on experience. Kolb (1976) states that an accommodator tends to be more of a risk-taker than

individuals with the other three learning styles. Adapting to specific circumstances and arriving at problem solutions through intuitions are characteristics of this style.

According to Stabell (1973), the accommodator prefers to rely on the expertise of others rather than on his or her own analytical ability. The accommodator's educational background is often in technical or practical fields such as business. In organizations, individuals with this learning style are found in action-oriented jobs such as marketing and sales (Kolb, 1976).

Theoretical and Conceptual Framework for the Adult Classroom Environment Scale

Environment Theory

The forerunner of social environment/climate theory Kurt Lewin (1935) referred to the environment as the field or "life space" and defined it as that which contains the person and the psychological environment as it exists for that person (Lewin, 1975). According to Lewin (1975), past and present experiences are components of the psychological environment. Feelings, such as wishes and fears, often represent the future perspective, while guilt often occurs as an individual reflects on the past. The learner's character/motivation, cognitive structure and ways of perceiving are also included in the field. Lewin (1975)

contended that all these various elements within the environment influence an individual's behavior.

Murray (1938) also focused on the influence of the environment on an individual's reactions. He referred to the influence of the environment as the environmental press or external demands and influences of a social setting. Murray's theory of environmental press was guided by a conceptual scheme which was the outcome of a prejudice in favor of the dynamic, organismal viewpoint. This viewpoint is regarded as a rationalized elaboration of the perception that a human being is motile, discriminating, valuating, assimilating, adapting, integrating, differentiating and producing temporal unity within a changing environment.

Within recent years, however, "dynamic" has come to be used in a special sense that accepts the goal-oriented (adaptive) character of behavior and attempts to discover and formulate the internal as well as the external factors which determine it. The following are selected propositions that guided Murray's (1938) theory on environmental press.

1. Since, at every moment, an organism is within an environment which largely determines its behavior, and since the environment changes sometimes with radical abruptness, the conduct of an individual cannot be formulated without a characterization of each confronting situation, physical and social.

2. The stimulus situation (S.S.) is that part of the total environment to which the creature attends and reacts. In formulating an episode, it is convenient to classify the S. S. according to the kind of effect facilitating or obstructing, the organism. Such a tendency or potency in the environment may be called a press.
3. The reactions of an organism to its environment usually exhibit a unitary trend.
4. More frequently the press meets the organism and incites a drive.
5. Each drive reaction to a press has a fortune that may be measured in degrees of realization (gratification).

He concluded that environmental press either promotes or hinders the satisfaction of needs for learners.

In his definition of ecological environment theory, Bronfenbrenner (1979) acknowledged that individuals and environments are interconnected. He maintained that the environment includes the individual, as well as other individuals and their interactions. Bronfenbrenner further stated that the developmental process of an individual prepares that individual to refashion his or her environment in order to be more compatible with his or her needs and desires. He also stated that the highest expression of development was one's ability to impact on his or her environment.

Social Environments and Learning

Lindeman (1961) viewed education as a dynamic venture in which students are affected by the educational environment. He stated that education was a type of behavior through which organisms attempt to adjust themselves to the external and internal factors which, having set up frictions, call for new adjustment.

In order to plan for learning environments in which students can make adjustments and continuously experience growth, teachers need to use the andragogical teaching method. The term andragogy was first used by European adult educators to refer to the art and science of helping adults (Knowles, 1984).

The physical and psychological climate of the social classroom environment was found to encourage learning (Knowles, 1984). Knowles identified some elements in the environment which are important for learning. These elements included the collaboration among group members, shared control, relevant activities, and reflection on class activities. The elements identified by Knowles tie closely with Moos' dimensions of classroom social environments.

Moos (1979) research focused on the elements of classroom environment and their impact on the behavior of students in secondary education. He found evidence in several categories to encourage his study of classroom environments. Levinson (1978) indicated that personal

traits of individuals partially explain differing responses to environments. These researchers further stated that these individuals respond differently in diverse instructional settings. From this perspective, Moos (1979) concluded that there was a need to study the effects of environments and students' behaviors and attitudes. He found evidence that agreed with what Scarr and Weinberg (1976) had found that long-term settings, such as supportive adoptive homes for formerly institutionalized children, had a strong effect on the development of their intellectual functioning, their occupational achievement, and their marital and family status when they grew up. Moos' work (1979) and what he had found in the literature led him to say that, "Conclusion about the influence of different environments vary, but all authors agree that the social ecological setting in which students function can affect their attitudes and moods, their behaviors and performance, and their self-concept and general sense of well-being" (P. 3).

Moos (1979) defined the classroom environment as the personality of the classroom. In order to study the classroom environment of junior and senior high school classes, the researcher developed the Classroom Environment Scale (CES). Moos believed that the classroom environment consisted of the teacher's behavior, interaction between the teacher and the students, and interactions among the

students. The results of the CES provided Moos with the knowledge of the student's perception of the classroom environment. Moos (1979) identified three domains of classroom environment as shown on the following table.

Table 1

The CES Subscales Descriptions (Moos, 1979, p. 29)

Subscale	Description
	Relationship Dimensions
1. Involvement	Extent to which students are attentive and interested in class activities and participate in discussions and do additional work on their own.
2. Affiliation	Student friendship and the extent to which students help each other with homework and enjoy working together.
3. Teacher support	Help, interest, trust, and friendship the teacher shows toward students.
	Personal Growth or Goal Oriented Dimensions
4. Task Orientation	Importance of completing planned activities and sticking to the subject matter.
5. Competition	Emphasis placed on students competing with each other for grades and recognition, and the difficulty of achieving good grades.
	System Maintenance and Change Dimensions
6. Order and Organization	Emphasis on students behaving in an orderly and polite manner and on the overall organization of assignments and class activities.
7. Rule clarity	Emphasis on establishing and following a clear set of rules and on students knowing what the consequences will be if they do not follow them.
8. Teacher control	How strictly the teacher enforces rules and the severity of punishment for rule infractions.
9. Innovation	How much students contribute to planning class activities, and the number of unusual and varying activities planned by the teacher.

Research indicates that warm, supportive relationships and high expectations are characteristics of an environment that results in the most effective student behavior (Halpin, 1990; Hirst & Bailey, 1983). Further research by Walburg and Moos (1980) on the effects of classroom environment on students' behavior, indicated that the CES and other comparable scales explain much of the variance in the effects of the environment on students' behavior. Additionally, the two researchers stated that although studies of the classroom environments in higher education are scarce, the available studies support the findings from research in elementary and secondary schools.

A study conducted by Fraser and Treagust (1986) on the classroom environment in Australian Universities revealed that a more agreeable classroom environment was favored by both students and instructors. The researchers further indicated that the instructors had a more positive view of the classroom environment than their students.

Moos' work on environment theory inspired Darkenwald and Gavin (1987) for their study of dropouts and classroom environment. Other researchers who influenced Darkenwald and Gavin included Lewin and his work on field theory and Murray and his work on needs-press. Darkenwald and Gavin believed that behavior is a joint product of individuals and their environment.

In their study on dropout and classroom environment, Darkenwald and Gavin (1987) used Moos' and Trickett's (1974) CES because of its integrated conceptual framework of interactions between individuals and their environment. The results of the study revealed that only one of the nine CES subscales significantly related to dropouts. These results therefore, led Darkenwald and Gavin to question the validity of the CES for social environmental research for adults in educational settings. The researchers concluded that the CES focused on elements of elementary and secondary classroom environments that are not appropriate for adults.

From this perspective, Darkenwald (1987) decided to developed a scale that would assess the classroom environment for adult classes. As a foundation for the scale, Darkenwald used social environment or climate theory, social ecology, and the fit between an individual and his or her environment. Other researchers who influenced him in the development of the scale included Lewin (1935) and his work on field theory and Murray and his work on environmental press (1938). Darkenwald was also informed by Moos' (1979) work on educational environments which indicated the importance of the interactions between teacher-student and student-student.

The Adult Classroom Environment

According to most educators, the classroom is an important locus for a student's personal and academic growth, and that it has an excellent atmosphere that mediates growth. As a result of this notion, interest among educators has continued to increase, thus, causing the classroom to become a major unit of study (Moos, 1979).

Different instructional patterns among classes in a school and between teachers using the same instructional materials also necessitates a focus on classroom differences. Variation occurs on how teachers speak and cover specific topics, even if they are using the same teaching style (Moos, 1979).

Copeland (1978) showed that the classroom socioecological system influences teacher behavior and student learning. The researcher asserted that a teacher's consistent use of a target skill (such as asking focused questions) caused that skill to become a functional part of the classroom ecological system.

The above ideas have led to the construction of methods for assessing the qualities of a classroom's environment. Some researchers have focused on developing detailed coding categories for teacher verbalizations and classroom activities as indicators for learning environment (Wilson, Spelman & Trew, 1976). Other approaches use global observational scales and self-report or perceptual indexes

to focus on the social-emotional climate or atmosphere of classes. Some techniques include a Classroom Climate Inventory, composed of self-report items, peer nominations, and teacher judgments (Barclay, 1974); a Learning Structure Questionnaire which assesses the learning environment on teacher-centered, class-centered, and self-directed dimensions (DiMarco, 1974); and a Learning Environment Inventory (LEI), which has been extensively used and related to such variables as class size, curriculum, and achievement (Walberg, 1976).

However, the Adult Classroom Environment Scale (ACES) developed by Darkenwald (1987), offers a different approach than other classroom environment scales in that the ACES assesses the classroom environment for adults. Darkenwald (1989b) observed that the classroom environment is composed of the interactions between teacher and students and other individual characteristics. His research on social environments indicated that the student-environment fit between the teacher and the students occurs when the teacher and the students have a shared responsibility in creating a setting in which learning occurs. The interactions between the students and the teacher serve as the basis of the social environment or the climate of the classroom. The communication patterns are composed of the teacher's communication with the entire class, with small groups, and with individual students.

The interactions among the students also plays a major role in contributing to the classroom environment.

Darkenwald used these concepts in the development of the Adult Classroom Environment scale (ACES) (Darkenwald, 1989b).

Darkenwald's (1989b) scale consists of two forms, referred to as the actual and the ideal. The actual form responses reveal the students' perceptions of the classroom environment as they see it. The ideal form reveals the students' preferred classroom environment. The researcher collected data from 308 adults in a community college located in a remote area, 156 adults taking evening classes in an M.B.A. program in a large Pennsylvania University, and 266 students in a large adult school located in a middle-class community. Additionally, data was collected from the teachers in the above institutions.

The results of the investigation revealed that the students preferred learning environment included the following characteristics: involvement, teacher support, task orientation, organization and clarity. Similarly, the results indicated a significant difference at 0.5 level on students' perceptions of the actual and ideal environments.

Generally, the teachers viewed the classroom environment as more positive and supportive of student growth than the students did. However, although the teachers and student's perception differed on various

dimensions, the results indicated that two dimensions of task orientation and student influence showed no significant difference.

Darkenwald (1989b) concluded that a great number of teachers are not aware of their students' views of the classroom environment. Lack of this knowledge hinders the teachers from providing the best environment for learning. The researcher further stated that when the teachers have the knowledge of their students' learning environment preferences and their views of the classroom environment, they tend to improve their quality of instructional environments.

Dimensions of the Adult Classroom Environment Scale

Involvement

Darkenwald (1989b) identified seven dimensions of the Adult Classroom Environment scale. He described the first dimension, involvement, as the extent to which the students are satisfied with class activities, participate in discussions and do additional work on their own.

Other researchers (Fideler, 1991; Hutchings, 1991) agree with the findings of Darkenwald. Hutchings (1991) emphasized the importance of students and teachers sharing responsibility for learning. She suggested that teachers should ask the students questions about their learning in

order to stimulate their participation. Hutchings further stated that as the students become familiar with the process, they become sensitive to their learning; thus they become involved in the procedure.

According to Check (1984), adults who participated in a study of classroom environment at the University of Wisconsin expressed preferences for involvement in the classroom. They identified discussion and class activities along with lecture as their preferred modes of learning.

The importance of involvement for students in remedial class activities was realized when the students were allowed to propose the ways in which classes should be conducted. The students who were involved in the planning of the activities were twice as likely to remain in school than those who were not involved (Griffith, Jacobs, Wilson, & Dashield, 1988).

Totten (1985) described a federal study group report on excellence in colleges, entitled "Involvement in Learning: Realizing the Potential of American Higher Education," found that there were three conditions for excellence. These conditions included student involvement, high expectations, and assessment and feedback. Student involvement, defined as the amount of time, energy, and effort students devoted to the learning process, held top priority in the report. Totten further indicated that the study group found a positive relationship between students' effort and their

achievement. Additionally, the study group recommended that colleges should advocate conditions that would enhance active learning in the classrooms by encouraging students to become participants rather than spectators in the learning process. At the same time, the study group recommended that colleges should focus on passive students in order to inspire them to be more involved in their own learning.

Emphasizing the importance of encouraging passive students to be more involved in their own learning, Altman and Arambasich (1982) study of locus of control found that students who have an external locus of control are more likely to drop out of school than are students with an internal locus of control. According to Rotter, Seeman, and Liverant (1962), individuals who exhibit an internal locus of control believe that they have control over their own actions; whereas the individuals with external locus of control believe that their life events are beyond their control. These individuals depend on reinforcements from external sources for their accomplishment. Additionally, the researchers revealed that men tend to have an internal locus of control, while women tend to have an external locus of control.

Several researchers agree that men and women use different methods for learning. Women tend to learn more in an environment where caring is shown, where they feel involved and where they can make connections (Belenky, et

al., 1986; Gilligan, 1982). Writing along the same lines, Lott (1985) and Knapp (1981) found that women respond positively to personal relationships in cooperative and helpful settings. On the contrary, Gilligan (1982) found that men tend to focus on accomplishments rather than on affiliation.

When women's perception of classroom environment was compared to men's using ACES, the results revealed that women were more affiliative than men. Similarly, when the perception of the degree of involvement in the classroom was compared between men and women, the results indicated that women perceived greater degrees of involvement in the classroom than men (Beer & Darkenwald, 1987).

Affiliation

According to Darkenwald's scale, the second dimension, Affiliation, is defined as the extent to which the students like and interact positively with each other. Darkenwald (1989b) believed that communication was a major component in the classroom environment. Similarly, Lindeman (1961) regarded it as the primary mechanism of education. The researcher contended that as the students interact with each other, they acquire new meanings. Additionally, students tend to learn by considering other students' responses to instructional concepts.

Schmuck and Schmuck (1983) contended that without some affiliation, human beings tend to experience feelings of

loneliness, worthlessness and anxiety which prevent the maximum use of their potential. Additionally, the researchers asserted that if the classroom atmosphere is such that the students feel liked and respected, they are likely to behave in a manner which makes them worthy of the like and respect of others. Likewise, when the classroom environment is filled with anxiety, hostility, and self-doubt, the students will behave in nonconstructive and unproductive ways, thus perpetuating the negative climate.

Irish (1978) also observed that a negative classroom environment plays a significant role in the drop out rate of the students. In support of Irish's study, Garisson (1985), using CES in an analysis of dropouts in adult basic education, found that affiliation was a major factor in predicting dropout. The results of his study indicated that the students who were low on the affiliation scale were more likely to drop out. Similar results were reported by Wilson (1980) when he studied the dropout rate and persistence of students in GED classes. The study indicated that those who dropped were less affiliated than those who persisted.

Literature on retention of black students in higher educational institutions which are predominantly white identified some major factors which influence retention. Among the factors identified were the effects of environmental characteristics, alienation and group identification. Of all the factors identified, environment

and affiliation were reported significant. Conclusion drawn from the literature review indicated that the way teachers related to the student was very important (Dunston, Richmond, & House, 1983).

An earlier study conducted by Urban (1978) using high school freshmen students supports the literature reviewed by Duston et al. (1983). The researcher studied high school freshmen to determine their perceptions of socialization into their school situation as influenced by the selection of friendship groups. Two of the findings of the study were that the high school freshmen perceive the teacher as a key factor in the development of interpersonal relations among students, and the classroom atmosphere is perceived by the students as affecting the socialization of high school freshmen. Urban concluded that components of the classroom are perceived as being critical to the lives of the students. These components include the atmosphere, role of the teacher, interpersonal relationships among students, and the curriculum materials utilized.

Teacher Support

The third dimension of ACES, teacher support, as identified by Darkenwald (1989b) assesses students' perception of their interactions with teachers. The researcher defined this dimension as the extent of help, encouragement, concern and friendship that the teacher directs toward the students on definite tasks. Research

indicates that students benefit from a combination of sensitive and encouraging relationships. Additionally, teachers expectations of students encourage students to work harder (Moos, 1980).

Freer (1984) observed that, in a normal class, teaching situations in which the teacher occupies the center of the stage, there is neither sufficient time available nor a context which is conducive for all children to engage in a meaningful verbal interchange with their teachers. Yet these interchanges may be the only means available to teachers to enable them to develop some form of accommodation between learning styles and teaching strategies which may be at variance with one another.

Teacher-student interaction is an important aspect of the classroom environment. The Texas Higher Education Coordinating Board (1991) on "Assessing Minority Opportunities in Vocational Education" reported that instructors' attitudes toward their students were a predominant determinant of student persistence. According to Alciatore (1979), students prefer instructors who have good personalities, are interested in them and the subject matter, and have the ability to communicate with them both verbally and nonverbally.

Verbal and nonverbal praise for students when they have achieved was found to be a motivating factor to the students (O'Heron, 1992). The researcher also found that the

instructor's attitude was among the factors that influenced minority students' educational improvement. Halpin (1990) also found that instructors' attitude was a major factor in predicting student persistence. The researcher asserts that when teachers interact with the students, spend time in small group activities, and are accessible to the students, the students become motivated in their classwork.

Task Orientation

According to Darkenwald (1989b), the fourth dimension, task orientation, assesses the extent to which the students and teacher maintain focus on task and value achievement. In order for the teacher and the students to maintain focus on task and value achievement, McDonald and Cotroneo (1981) stated that respect between the teacher and the students must be maintained. The researchers noted that respect was an important element in task orientation. McDonald and Cotroneo further stated that the instructors who foster mutual respect between themselves and the students by setting clearly defined objectives and creating pride in accomplishment are likely to create a healthy classroom environment suitable for a student's success.

Short and Short (1988) investigated the relationship of classroom environment variables to student on-task behavior in secondary school classrooms. The results of their study showed that classroom environment is related to on-task behavior in secondary school classrooms.

The results further indicated that students demonstrated a higher level of on-task behavior when they perceived that there were clear rules for behavior and activities in the classroom.

Personal Goal Attainment

The fifth dimension, personal goal attainment, as identified by Darkenwald (1989b) assesses the extent to which the teacher is flexible in providing opportunities for students to pursue individual interests. In order to pursue individual interests, students need to learn new skills which are relevant to their real world. For example, Beder (1990) found that learning environments which encourage learning that is relevant to the student constitutes one of the core principles in adult education.

Researchers have reported consistent findings in studies on the effects of learning environment (Jason & Nelson, 1980; Moos, 1974). For example, students who work under pressure and in a competitive environment (goal orientation) in high school science classes score high on measures of achievement, critical thinking, and understanding of science; whereas, those in classes with a relatively calm environment (relationship dimensions) gain more on measures of interest and activities (Fraser, 1987; Walberg, 1976).

Michaels (1977) argued that when competitive or independent reward structures are geared towards the

achievement of the student's goals, they tend to be more effective in strengthening student performance and in increasing such traditional outcome measures as achievement test scores. Additionally, Michaels asserts that relationship - and innovation - oriented classes can create student satisfaction and interest in the subject matter. These classes enhance social growth (friendliness, helpfulness, personal growth, independence, self-esteem and creativity). As the students gain self-esteem and creativity, Michaels observed that they tend to be persistent in pursuing their life goals.

However, although students learn more in classes that emphasize difficulty of subject matter and competition among students, Maehr (1976) observed that these classes also have high absenteeism rates. The researcher asserts that task orientation and competition encourage cognitive growth for some students; for others, they can result in absenteeism, poor grades and an increasing chance of dropping out. Likewise, emphasis on academic tasks and extrinsic rewards (such as grades) can have the opposite of intended effects. For example, it may minimize interest for material not associated with class and inhibit intrinsic motivation to learn, especially for achievement oriented students.

Similarly, individual competition can cause adverse results, especially with low-ability students who need to try hard to get their work done. Likewise, less able

students experience anxiety and feel less self-assured when they are in a competitive, reward structured environment.

Organization and Clarity

Organization and clarity was identified as the sixth dimension of the ACES (Darkenwald, 1989b). This dimension consists of an element of the classroom environment which measures the extent to which the classroom functions are orderly, clear, and coherent.

Moos and Trickett (1986) provided studies in which the teacher's and classes' perceptions were compared. The studies revealed that the teacher, as the authority figure and responsible for the class, tended to place greater emphasis on most dimensions of the classroom environment and viewed those dimensions more positively. Likewise, where students perceived greater degrees of teacher control, teachers reported much higher involvement, teacher support and rule clarity. The teachers also tended to perceive greater degrees of affiliation, task orientation, competition, order and organization.

A similar study, conducted by Smith and Cranton (1992) on the student perceptions of teaching skills, indicated that students associated interest and atmosphere with effective teaching. Additionally, students in lower level courses viewed organization and clarity as factors related to effectiveness.

Hirst and Bailey (1983) designed a study to identify

classroom teaching competencies needed for effectiveness. The researchers identified several competencies as highly important for the teacher to be effective. Among the competencies identified were the need to tell the students what teachers would expect of them at the beginning of the semester, the need to tell the students how they would be evaluated, the need for the course materials to follow a logical order, the need to help students to organize materials, and the need to write instructional objectives with students' achievement level in mind.

Organization and clarity were also found to be significant factors by Marsh and Bailey's (1993) instrument, the Students' Evaluation of Educational Quality (SEEQ). The items in this dimension of their instrument were designed to clarify whether the lecturer's explanation were clear, whether the materials were well prepared, whether course objectives were well stated and pursued, and whether lectures facilitated the taking of notes. Other dimensions in the scale included Assignments and Readings and Workload.

Student Influence

ACES' last dimension, student influence, assesses the extent to which the teacher is learner-centered and allows students to participate in course planning decisions (Darkenwald, 1989b). Perrin (1990) involved students in planning class activities by dividing the classroom into small groups in order to develop activities suited to

various student perceptual strengths and to design ways to accommodate their needs. The researcher found that at the end of the semester, students experienced major success in the form of passing grades in the areas of English, social studies, math and science courses.

Emphasizing the importance of this dimension, Lindeman (1961) indicated the need for educators to determine the interests of the students in order to make adjustments that would help meet their needs. He suggested a four-step approach for this process.

The first step seeks to identify the type of situation at hand, while step two seeks to identify the problem that situation presents. Step three seeks to identify the new information that step two involves, while step four seeks to identify the action that will lead to a solution.

Questioning, as advocated by Lindeman, promotes the influence of the student in planning course content. Hutchings (1991) suggested that the teacher should ask questions about what the students are learning in their courses. This process empowers the student to ask their own questions about their courses.

Researchers agree that empowerment helps the students with internal locus of control to work harder to achieve than those with external locus of control. Additionally, they also agree that in order to provide motivation for students, teachers should include them in the decisions

regarding their learning (Altman & Arambasich, 1982; Rotter, 1966; O'Heron, 1992).

Congruence and Perception of Classroom Environment

Gregorc (1979) contended that teachers whose learning styles are congruent with their students' learning style reported comfort, ease and authenticity and perceived the classroom environment as friendly and enjoyable. On the contrary, when there was a mismatch in learning styles, teachers reported feelings of awkwardness, lack of efficiency and authenticity, and pain mentally and physically which affected the classroom environment adversely.

Gregorc further reported that prolonged and chronic mismatch can result in stress, even burnout, which may lead to serious mental, emotional or physical problems for both teachers and students. Eventually, the problems experienced as a result of mismatch lead to an unproductive classroom environment. Feldenkrais (1972) drew a parallel to what Gregorc saw as problems of mismatch by stating, "force that is not converted into movement does not simply disappear, but is dissipated into damage done to joints, muscles, and sections of the body" (p. 58).

From intensive interviews Gregorc (1979) found that children, adolescents and adults learn easier in certain environments and under certain conditions than they do in others. The researcher further reported that one of the

ingredients of a classroom environment conducive to learning was a congruence between the teacher's learning style and student's learning style. Additionally, when there was congruence in learning styles, Gregorc reported that students' achievement in school increased.

Learning styles research has shown that human beings can separate themselves physically and mentally from their environments. Similarly, some individuals demonstrate separate, independent, individual "me-oriented" behaviors and appear to learn and produce best in environments which support such behaviors. Other individuals, however, reveal a natural affinity toward collective, interdependent, group "we-oriented" activities. Such natural orientations toward and away from specific environments should prompt teachers to analyze students' behaviors and their learning styles in order to accommodate each student in the creation of a classroom environment that will enhance learning (Gregorc, 1983).

Effective teaching is certainly more than imparting knowledge of a subject, but rather it is the genesis of stimulating the love for learning (Barret & Kepler, 1991). Jones and Lowe (1990) contended that teaching is a combination of efficiency and effectiveness. While efficiency is concerned with doing things right, effectiveness is concerned with doing the right things. Effectiveness involves focusing upon opportunities, not

difficulties. The researchers further argued that effective teachers spontaneously vary their approach depending upon the needs and the task and the people involved in learning. Additionally, effective teachers develop knowledge pertaining to students' learning style.

Identifying students' learning styles helps the teacher to match his or her style to the student's style and to accommodate students whose learning styles are different from theirs. Similarly, identifying students' learning styles helps the teacher to appreciate the differences the students bring into the classroom.

Potter and Emmanuel (1990) showed that when students' expressiveness was measured as perceived solidarity (closeness between teacher and student) and expressed through learning styles, openness and friendliness were experienced in the classroom. Additionally, feelings of cooperation, liking, attraction and trust were fostered in the classroom environment.

An award-winning learning style research report showed that what a student learns depends on the student's degree of interest in what is taught and the educational conditions under which he or she learns best. Additionally, the research showed that the congruence in learning styles between the teacher and student enhanced the student's learning process and provided a better classroom environment for instruction (Marshall, 1991).

Writing along the same lines, Bargar and Hoover (1989) reported that students whose learning styles are different from teachers' learning styles are likely to be confused by the lack of congruence between the teacher's approach and their own natural approaches. Depending on how teachers differ from the students in for example, thinking versus feeling, sensing versus intuiting, introversion versus extroversion, students will react in varying degrees. The researchers further stated that when teachers become insensitive to student differences in style, students tend to perceive the classroom environment as distressing. Prolonged insensitivity on the part of the teacher may cause damaging effects on the student's confidence and motivation.

In summary, research studies have indicated that most successful students in a classroom happen to have learning styles that are congruent with the teacher's learning style. However, when there is an incongruence in styles, students become confused and perceive the classroom environment as hostile. Similarly, energies of a teacher flow with varying degrees of difficulty and frustration when his or her personal learning style is mismatched with the student's learning style. Chronic periods of acute mismatch can result in major mental, emotional, and physical problems if the mismatch is not recognized and dealt with appropriately. Therefore, effective teachers must strive to match their learning styles with the students' learning styles and must

reach those students who are mismatched with their own learning style by using diverse strategies instead of those that they prefer to use.

Research Questions and Hypotheses

As a result of the related literature review, the following research questions and hypotheses were developed.

Research Question 1: What are the predominant learning styles of undergraduate education majors and the faculty involved in teaching them?

Hypothesis 1: There is a difference in the learning styles of the students participating in the study and the faculty involved in teaching them.

Research Question 2: What are the students' and faculty's perceptions of the classroom environment in the colleges participating in the study?

Hypothesis 2a: There is a difference in the perception of the actual classroom environment by the students and faculty who taught the class.

Hypothesis 2b: There is a difference in students' perception of the ideal classroom environment and their teachers' perception of the actual classroom environment.

Hypothesis 2c: There is a difference in students' perceptions of the actual and ideal classroom environment.

Research Question 3: What are the students' perceptions of the classroom environment when their learning styles are matched with their teachers?

Hypothesis 3a: There is a difference in the students' perception of the actual classroom environments when students' learning styles are matched or mismatched with their teachers' learning style.

Hypothesis 3b: There is a difference in the perception of the ideal classroom environment when students' learning styles are matched or mismatched with their teachers' learning style.

Hypothesis 3c: There is a difference between matched and mismatched students' differences on the ideal and actual scores of the ACES.

Research Question 4: Is there a relationship between learning style differences and assessment of the actual classroom environment by students?

Hypothesis 4: There is a relationship between learning style differences and the assessment of the actual classroom environment by students.

Research Question 5: What are the perceptions of men and women students of the actual classroom environment?

Hypothesis 5: There is a difference between men and women students' perception of the actual classroom environment.

Research Question 6: What are the perceptions of men and women students of the ideal classroom environment?

Hypothesis 6: There is a difference between men and women students' perception of the ideal classroom environment.

CHAPTER 3

Methodology and Procedures

Population

The population for this study included all the undergraduate students majoring in education who were enrolled in foundations classes in Fall, 1994, and all the teachers involved in teaching those students in selected colleges for teacher education. The list of foundations courses selected in all the colleges is provided in Appendix A. These courses are all similar in content to School II, a foundations course taught at ETSU. In these courses the historical, philosophical, and socio-cultural foundations for teaching are stressed. Similarly, special emphasis is accorded issues in multicultural education. The selected colleges included: East Tennessee State University, Milligan College, Carson-Newman College, Maryville College, Tennessee Wesleyan College, and King College. The names of the colleges, the number of students enrolled in the foundations classes, and the number of teachers involved in teaching the students are shown in Table 2.

Sample

The sample constituted all of the undergraduate students majoring in education who were enrolled in foundations classes in the Fall 1994 in the colleges of

education participating in the study. Also, all teachers involved in teaching the students participating in the study constituted the teachers' sample.

Table 2
Colleges, Total Enrollment of Students in the Foundations-Oriented Course, and the Number of Teachers Involved in Teaching Them

College	Number of Students	Number of Teachers
ETSU College of Education	86	3
Milligan College	8	1
King College	15	1
Carson-Newman College	50	2
Tusculum College	24	1
Wesleyan College	9	1
Maryville College	11	1
Total	<u>203</u>	<u>10</u>

Data Collection Instruments

Kolb's Learning Style Inventory, 1985

The Kolb's Learning Style Inventory (LSI-1985) was used to measure the learning styles of both students and teachers (see Appendix D and E). Kolb developed the LSI on

the basis of his model of experiential learning. The test is a 12-item questionnaire in which the respondents attempt to describe their learning styles. Each item asks respondents to rank - order four sentence endings that correspond to four learning modes - - Concrete Experience (feeling), Reflective Observation (watching), Abstract Conceptualization (thinking), and Active Experimentation (doing).

The LSI measures an individual's relative emphasis on the four learning orientations CE, RO, AC, AE, and on two combination scores that indicate the extent to which the individual emphasizes abstractness over concreteness (AC-CE) and the extent to which he or she emphasizes action over reflection (AE-RO). These two difference scores place an individual in one of the four quadrants formed by the intersection of the AC-CE and AE-RO axes. A dominant learning type is identified according to the learning style preferred: Accommodator, Diverger, Converger, and Assimilation.

Administration

The LSI is designed to be self-administering. Individuals interested in taking the test are given a self-scoring test and interpretation booklet which includes instructions on how to complete, score and interpret the test results. The LSI is completed by responding to 12 sentences with a choice of four endings. The endings for

each sentence are ranked according to how well one thinks each one fits with how one would go about learning something. The LSI can be administered individually or in groups. The author emphasizes the usefulness of stressing two points when introducing the test to a group of respondents:

1. There are no right or wrong answers. The learning strengths described are equally valuable. The purpose of the inventory is to help assess individual skills in learning experience.
2. Rank-order the four sentences endings in each set. Do not make ties.

Scoring

The LSI is usually scored by hand in a section of the test booklet directly below the 12 sentences. The respondents add the 12 numbers entered in each of the four columns. The columns represent the four learning styles as follows:

Column 1 = Concrete Experience

Column 2 = Reflective Observation

Column 3 = Abstract Conceptualization

Column 4 = Active Experimentation

The resulting raw scores range from 12 to 48. Next, the combination scores are obtained by subtracting:

AC-CE = Abstract Conceptualization minus Concrete Experience.

AE-RO = Active Experimentation minus Reflective Observation. These scores range from +36 to -36.

Kolb (1985) indicated that items in LSI-1985 are drawn from two sources: the original LSI items translated into simpler language, and a new set of six items per scale. The original items that have been revised now appear as items 4, 5, 6, 7 (column 2 only), 8 (column 9 only), 10, 11, (columns 1 and 3 only), and 12.

Other Considerations

The LSI is untimed but generally takes about 10 minutes to complete. This makes it an attractive test to use for both guidance and research purposes. The format and approach of the LSI provides a very non-threatening environment for the evaluation of learning style. The vocabulary level is designed for individuals in their late teens and should present little difficulty for the average adult.

Reliability

The original LSI was revised in 1985 to overcome some psychometric limitations of the original version (Kolb, 1985; Smith & Kolb, 1986). The revised version, LSI-1985, is a self-report inventory with 12 blocks of four items. Each block has one item representing each of the learning abilities. Within each block, individuals are asked to rank-order the items from 1 to 4, with "4" indicating the best description of how one learns. To facilitate self

scoring, the items are arranged in four columns on one page with all items for a single scale in the same column.

The LSI-1985 manual indicates that the four basic scales and two combination scores all show very good internal reliability as measured by Cronbach's alpha (n=268). The combination scores show almost perfect additivity (1.0) as measured by Tukey's test.

	Cronbach's Standardized Scale Alpha	Tukey's Additive Power
Concrete Experience (CE)	.82	.91
Reflective Observation (RO)	.73	1.09
Abstract Conceptualization (AC)	.83	1.07
Active Experimentation (AE)	.78	1.03
Abstract-Concrete (AC-CE)	.88	1.00
Active-Reflective (AE-RO)	.81	.99

Comparison of LSI-1985 with Items from the Original LSI ("OLSI") as Revised and Simplified

Strong correlations between the two instruments indicate that their results are comparable (n=268)

	Split-Half Reliability 6 OLSI + 6 New Items (Spearman-Brown)	Correlation Between OLSI and Total LSI-1985
Concrete Experience (CE)	.81	.89
Reflective Observation (RO)	.71	.87

Abstract		
Conceptualization (AC)	.84	.92
Active		
Experimentation (AE)	.83	.92
Abstract minus		
Concrete (AC-CE)	.85	.92
Active minus		
Reflective (AE-RO)	.82	.93

In addition to the information reported in the technical manual, other researchers have indicated an improvement in internal consistency of the LSI-1985 over the original version. For the standard form of LSI-1985, estimates of coefficient alpha for the ability scales have ranged from .73 to .86 with an approximate average in the low .80s (Atkinson, 1988; Ruble & Stout, 1990; Sims, Veres, Watson, & Buckner 1986; Veres, Sims, & Shake 1987).

Ruble and Stout (1991) demonstrated the classification stability of alternate forms of the LSI (standard style and scrambled style) after first and second administration (5 weeks interval) by computing Kappa Coefficients in order to assess the degree of agreement in classification. The results for the standard version indicated that 56% of the respondents (n=139) were placed in the same category for test and retest ($K=.39, p<.0001$). For the scrambled version, 53% of the respondents (n=253) were placed in the same category for both administrations ($K=.36, p<.0001$). The significant Kappa coefficients indicate that the LSI

classifies subjects better than chance.

Validity

In support of the validity of the LSI, Kolb (1976) performed several correlational studies relating the LSI scores to performance tests, personality tests, academic specialization, and preference for learning situations and particular teachers. The results indicated significant relationships at .05 level of significance.

Kolb (1985) further reported several validity relationships between LSI-1985 and career fields of study. For example, Education (Diverger) .95, Arts (Diverger) .74, and Technical trades (Converger) .95.

According to Freedman and Stumpf (1980) and Wilson (1986), both the original and the LSI-1985 are considered to have appealing face validity. Writing along the same lines, Pigg, Busch, and Lacey (1980) suggested that:

Despite the cautions against utilizing inventories such as Kolb's for developing educational programs, the learning style inventory does appear to be a useful instrument. A number of individuals, including these researchers, have reported that the inventory really captured tendencies in their personal learning behavior. Being able to recognize these tendencies, and relate them to behavior patterns is important. Thus, it is concluded that the LSI may be effectively employed as a useful device in the actual conduct of educational programs or in a participatory approach to the development of adult education programs due to its high degree of face validity. (p. 243)

Sewall's (1986) examination of correlations between the LSI and scores on the Myers-Briggs, the Thematic Apperception Test, and Firo-B supported the construct

validity of inventory. Numerous researchers (Ferrell, 1983; Katz, 1986; Marshall & Merritt, 1985; Wilson, 1986) have examined and found support for Kolb's two bipolar dimensions, CE versus AC and AE versus RO.

Ferrell (1983) studied four learning style instruments to determine the congruency of factors identified in each instrument and supportive theory. The results indicated that Kolb's LSI was the only instrument whose factors identified, and supportive theory were congruent. The LSI supported Kolb's conceptualization of learning. Katz (1986) administered the 1976 version to students at the Hebrew University of Jerusalem. The results of both a two - and a four - factor solution were analyzed. Katz concluded that both analyses were in agreement with Kolb's theory.

According to Cornwell, Manfredo, & Lacey (1991), most of the research concerning the construct validity of the original Kolb LSI (1976) supported a bipolar structure of learning. In their investigation on the soundness of both the individual learning ability dimensions and the two bipolar dimensions of the LSI-1985, the researchers found that a two and a four factor solution moderately supported the individual ability and the bipolar dimensions.

The Adult Classroom Environment Scale (ACES)

Perceived classroom environment will be measured by using the Adult Classroom Environment Scale (ACES) (see Appendix B and C) developed by Darkenwald (1989a). The

scale consists of two forms. One form is referred to as the ACES-Actual and the other one as the ACES-Ideal. The actual form's responses reveal the students' perception of the classroom environment as they see it, while the ideal form's responses reveal the students' perception of the classroom environment the way they would prefer it. Permission was granted to use the form by Dr. Darkenwald (see Appendix D).

Darkenwald (1987) drew items from different sources when he was developing the scale. The sources included interviews with teachers of adults and interviews with adult students as well as similar instruments designed to measure classroom environments for other populations. He used Moos' (1979) Classroom Environment Scale (CES) domains to categorize the subscales of ACES. The CES domains were the Relationship, Personal Development/Goal Orientation, and System Maintenance and Change.

Darkenwald's (1987) research team selected 159 items which appeared relevant to the classroom environment. Then, a panel of experts selected 89 items from the original 159. The 89 items were pilot-tested by Darkenwald using 220 adult students from various settings and using the class as the unit of analysis. After pilot testing, the scale was reduced to 49 items on the basis of standard item-analysis procedures and feedback from respondents. Finally, the 49 items were divided into seven subscales as described Table 3, below.

Table 3

Descriptive Summary of ACES Subscales (Darkenwald, 1987, p. 128)

Subscale Category	Description
Involvement	Extent students are satisfied with class and participate actively and attentively in activities.
Affiliation	Extent students like and interact positively with each other
Teacher Support	Extent of help, encouragement, concern, and friendship the teacher shows toward students.
Task Orientation	Extent to which students and teacher maintain focus on task and value attainment
Personal Goal Attainment	Extent to which teacher is flexible, providing opportunities for students to pursue their individual interests.
Organization and Clarity	Extent to which class activities are clear and well organized.
Student Influence	Extent to which teacher is learner-centered and allows students to participate in planning decisions.

Scoring

The ACES items are usually scored 1, 2, 3, and 4, respectively, for the responses "Strongly Disagree," "Disagree," "Agree," "Strongly Agree," except for the items designated (-). The items accompanied by (-) are reverse scored (Darkenwald, 1987). The following are the items that comprise each scale.

INVOLVEMENT

Students are often bored in the class. (-)

Students often ask the teacher questions.

Most students enjoy the class.

Most students look forward to the class.

Most students in the class pay attention to what the teacher is saying.

Most students take part in class discussions.

A few students dominate the discussions in class. (-)

AFFILIATION

Students often share their personal experiences during class.

The students in the class work well together.

The students in the class learn little from one another.

Friendships have developed in the class.

Students seldom interact with one another during class.

(-)

TEACHER SUPPORT

The teacher makes little effort to help students succeed. (-)

The teacher talks down to students. (-)

The teacher encourages students to do their best.

The teacher cares about students' feelings.

The teacher respects students as individuals.

The teacher likes the students in the class.

The teacher cares whether or not the students learn.

TASK ORIENTATION

The teacher seldom talks about things not related to the course.

Students regularly meet assignment deadlines.

Students often discuss things not related to course content. (-)

Activities not related to course objectives are kept to a minimum.

Students do a lot of work in the class.

Getting work done is very important in the class.

The class is more a social hour than a place to learn.

(-)

PERSONAL GOAL ATTAINMENT

The class is flexible enough to meet the needs of individual students.

Many students think the class is not relevant to lives.

(-)

The teacher expects every student to learn the exact same things. (-)

Students in the class can select assignments that are of personal interest to them.

Most students in the class achieve their personal learning goals.

The teacher tries to find out what individual students want to learn.

Students have the opportunity to learn at their own pace.

ORGANIZATION AND CLARITY

The teacher comes to class prepared.

Learning objectives were made clear at the start of the course.

The class is well organized.

The class lacks a clear sense of direction. (-)

The subject matter is adequately covered.

Students do not know what is expected of them. (-)

Learning activities follow a logical sequence.

STUDENT INFLUENCE

The teacher makes all the decisions in the class. (-)

Students help to decide the topics to be covered in class.

The teacher sticks to the lesson plan regardless of student interest. (-)

Students participate in setting course objectives.

The teacher rarely dominates classroom discussion.

Students feel free to question course requirements.

The teacher seldom insists that the student do things his or her way (Darkenwald, 1989b).

According to Darkenwald (1989b), the items in the scale reflect the students' and teachers' characteristics and interactions. These interactions serve as the core of the classroom environment. The communication patterns are

comprised of the teacher's communication with the entire class, small groups and individual students and students' interactions with each other.

Reliability and Validity of the ACES

The subscale and full-scale reliability measures were obtained by computing Cronbach's alpha for the student actual form of ACES, the student ideal, and the teacher actual. The reliability coefficients obtained indicated that the instrument was reliable. The measures obtained for the full-scale reliability coefficients were .94 for the student actual form of ACES, .93 for the student ideal, and .90 for the teacher actual (Darkenwald, 1987).

No predictive validity was assessed since there was no criterion variable. Nevertheless, other forms of validity were supported. Darkenwald (1987) asserted the presence of content validity due to the careful and methodical approach undertaken in selecting the scale items. His evaluation of ACES for discriminant and concurrent validity provided evidence for both. Darkenwald's (1987) claim for discriminant validity was based on the low to moderate intercorrelations among the subscales. This indicated that the subscales did not measure the same thing as evidenced by the wide range of intercorrelations ($r = .23$ to $r = .70$) among the subscales.

In order to check for concurrent validity, Darkenwald (1987) inserted two items in the instrument to serve as

validity check. The items included were the following:

"I enjoy this class."

"I am learning a lot from this class."

According to Darkenwald (1987), the two items inserted as validity checks exhibited the students' satisfaction and success with the class. The correlations between the items and the subscales further supported concurrent validity. The subscales correlation computed by using the Pearson Product Moment of Correlation yielded the following measures: Involvement (.71), Affiliation (.49), Teacher Support (.70), Task Orientation (.54), Personal Goal Attainment (.60), Organization and Clarity (.68), Student Influence (.74), Total Scale (.77). All the correlation coefficients were significant beyond .001 level.

A study conducted by Beer and Darkenwald (1989) using the ACES to compare the perceptions of adult males and females on affiliation and involvement revealed a scale reliability for the actual of .94. Similarly, the reliabilities for the involvement and affiliation were realized as .80 and .73, respectively. The researchers concluded that the classroom environment yielded significant differences in the perceptions of both males and females.

Data Collection and Procedures

Procedures

Permission to conduct the study was obtained from the Institutional Review Board of East Tennessee State University. At each of the institutions targeted for the study, the Director of the Teacher Education Program was contacted by telephone. The purpose in contacting the directors was to acquaint them with the proposed study, and to ask for their permission to administer the survey to the undergraduate students majoring in education and their instructors. To maintain uniformity across the colleges participating, all the undergraduate education majors were surveyed in courses that stressed the foundations of education. At ETSU, the course targeted was School II. School II is designed to inform the students about the historical, philosophical, and socio-cultural foundations for teaching. Special emphasis is accorded issues in multicultural education. Whereas the course is called School II at ETSU, other colleges of education teach the same course under a different name. To identify foundations courses in other colleges, each director of teacher education in colleges participating was given the description of School II over the telephone. The director was then able to identify the foundations course that fit the description of School II. The title of the foundations

course in each college and the course description is displayed in Appendix A. Additionally, the information concerning the number of students enrolled in each class and their instructors was requested. After the courses had been targeted, a visit to the colleges was arranged by the researcher to meet with the directors and the instructors. Any questions from the directors and the teachers were addressed at this time.

Similarly, a copy of the Learning Style Inventory and the Adult Classroom Environment Scale was given to the directors and the instructors. The researcher acquainted them with the administration of the instruments at this time. Additionally, a letter was given to the instructors to be read to the class before the administration of the instruments in order to seek the students' verbal consent. An appropriate number of the instruments was left with the instructors of each college (see Appendix F).

The instructors were requested to conduct the individual class surveys for each college. Both the instructor and the students were requested to complete the LSI-1985 in order to determine their learning styles. Additionally, the instructors and the students were asked to complete the ACES. However, the instructors were asked to complete only the first section which assesses his or her perception of the actual classroom environment. The completed questionnaires were returned to the director of

each college, who then contacted the researcher to collect the questionnaires.

The collection of the data consisted of results of the LSI and the ACES. No names of individual students were used in any type of report. The results of individual students were not given to any one other than to the student himself or herself. However, a brief summary of the results was given to the directors of each college for their feedback.

Demographic information was obtained from each individual participating in the survey by using a standardized form. Both the LSI and ACES were scored by the researcher.

Data Analysis

Data analysis for the Research Question 1 focused on patterns of behavior based upon measures of central tendency and measures of dispersion. Several t-tests for dependent means were used for hypotheses 1, 2a, 2b, and 2c. For hypotheses 3a, 3b, and 3c, t-tests for independent means were used to compare matched and mismatched students. Pearson Product Moment Correlations were used to test the strength of the relationships between the learning style differences and classroom environment differences in hypothesis 4. For hypotheses 5 and 6, t-tests for independent means were used to compare men and women students' perception of the actual and the ideal classroom

environment. All statistical tests were conducted using a .05 level of significance. Upon completion of the statistical analysis, the results were summarized and implications drawn. Suggestions for further study was discussed.

CHAPTER 4

Data Analysis

The purpose of this study was to determine the extent of congruence between teachers' and undergraduate education majors' learning styles in selected colleges of the Tennessee Association of Colleges for Teacher Education, and to determine if the style congruence was related to students' perceptions of the classroom learning environment. A related purpose was to identify needed changes in classroom environments based on the characteristics of the actual and ideal classroom environments as perceived by students, characteristics of the actual classroom environment as perceived by their teachers, and characteristics of actual and ideal classroom environments as perceived by men and women students. A relationship of classroom environments was also examined.

Collection of Data

Kolb's Learning Style Inventory (LSI) and the Adult Classroom Environment Scale (ACES) were administered to students and instructors from the end of October through the middle of November, 1994 at seven colleges of education that were members of the Tennessee Association of Colleges for Teacher Education. The students who participated in the study consisted of all the undergraduate education majors enrolled in School II. The teachers who taught the students in School II also participated in the study. Each college

was visited one week before the administration of the instruments. The purpose of this meeting was to brief the director and the teacher whose class was to participate in the study. The teachers were also acquainted with the instruments and how to administer them. The teachers were asked to administer the instruments to their classes by the middle of November, 1994.

The total student population was 203. However, there were some students who were not present at the time the survey was administered. At ETSU, the total student population was 86, but 78 responded to the survey. Carson-Newman had a total student population of 50 but those who responded were 44. The total population at Tusculum College was 24; however, 3 did not respond, and 2 respondents did not complete the entire survey. The entire student population at King College (15) responded to the survey. Similarly, the entire student population at Maryville College (11), Milligan College (8), and Tennessee Wesleyan College (9) responded to the survey. In total 184 (91.5%) students responded to the survey. All the teachers (10) involved in teaching the students participating in the study responded to the survey. Data for each college are shown in Table 4.

Table 4

Number of Teachers and Students Surveyed at Each College

College	Teacher f (%)	Students f (%)
1. East Tenn. St. University	3 (30.00)	78 (42.39)
2. Carson-Newman College	2 (20.00)	44 (23.91)
3. King College	1 (10.00)	15 (8.15)
4. Maryville College	1 (10.00)	11 (5.98)
5. Milligan College	1 (10.00)	8 (4.35)
6. Tusculum College	1 (10.00)	19 (10.33)
7. Tennessee Wesleyan College	1 (10.00)	9 (4.89)
Total	<u>10 (100)</u>	<u>184 (100)</u>

As shown in the table, 42% of the students came from East Tennessee State University. The next largest group of students came from Carson-Newman College (24%). The smallest number of respondents came from Milligan College (4%).

Students reported demographic data about their age, gender, time and day of class meetings, and student status (freshmen, sophomore, junior or senior). These results are presented in Table 5.

Table 5

Demographic Profile of Students Surveyed

Demographic characteristic	Frequency <u>f</u>	Percentage <u>%</u>
<u>Age</u>		
Less than 24	150	81.50
25 or older	34	18.50
Total	184	100.00
<u>Gender</u>		
Male	58	31.50
Female	126	68.50
Total	184	100.00
<u>Status</u>		
Freshman	7	3.80
Sophomore	43	23.40
Junior	67	36.40
Senior	67	36.40
Total	184	100.00

As shown in the table most (82%) of the students were less than 25 years. The majority (69%) were females. The status of the students indicated that an equal number of junior (36%) and seniors (36%) responded to the survey.

Teachers reported their age, gender, education level, and years of experience. These results are shown in Table 6.

Table 6

Demographic Profile of Teachers Surveyed

Demographic Characteristic	Frequency <u>f</u>	Percentage <u>%</u>
<u>Age</u>		
Less than 45	5	50
46 or older	5	50
Total	10	100
<u>Gender</u>		
Male	8	80
Female	2	20
Total	10	100
<u>Highest Degree Held</u>		
Master's Degree	3	30
Doctorate Degree	7	70
Total	10	100
<u>Years Taught In The Same College</u>		
Less than 1	4	40
2 - 5 Years	2	20
6 - 10 Years	1	10
Over 10 Years	3	30
Total	10	100

As shown in the table, the majority of teachers (80%) were males who held doctoral degrees (70%). A large number (40%) of the teachers had taught less than one year at the same institution. The next largest group of teachers had taught at the same institution for more than 10 years.

Research Questions and Related Hypotheses

Six research questions served to guide the analysis. Each research question was followed by a hypothesis or

several hypotheses.

Research Question 1: What are the predominant learning styles of the undergraduate education majors and the faculty involved in teaching them?

To answer this question, the four learning style types: Accommodator, Diverger, Converger, and Assimilator were determined for both students and their teachers. A comparison was made between the four learning styles for the students and teachers in order to determine the dominant learning style for each group. The dominant learning styles for students are displayed in Table 7.

Table 7

Student's Dominant Learning Style

Learning styles	f	%
Accommodator	57	31.00
Diverger	54	29.30
Converger	28	15.20
Assimilator	45	24.50
Total	184	100.00

The majority of the students (31.00%) were Accommodators followed very closely by Divergers (29.30%). Those who were identified as Assimilators (24.50%) were followed by Convergers (15.20%).

The mean scores for the four learning modes of the students displayed in Table 8 reflect that the majority of the students were Accommodators who relied more on active experimentation (AE) mode of learning ($M = 34.29$), combined with concrete experience (CE) learning mode ($M = 21.45$). Both AE and CE learning modes comprise the dominant learning style of Accommodator. These students prefer to learn primarily from "hands-on experience," carrying out plans and involving themselves in new and challenging experiences.

About 29 percent of the students were Divergers who relied more on the reflective observation (RO) mode of learning ($M = 31.21$), combined with concrete experience (CE) mode of learning ($M = 21.45$). Both RO and CE comprise the dominant learning style of Diverger. These students prefer to learn by viewing concrete situations from different points of view, and by observing situations rather than taking action. Approximately 25 percent of the students were classified as Assimilators who relied more on reflective observation (RO) mode of learning ($M = 31.21$), combined with abstract conceptualization (AC) mode of learning ($M = 27.94$). The two learning style modes (RO, AC) comprise the dominant learning style of Assimilator. These students prefer to learn by putting a wide range of information into concise, logical form. Another 15 percent of the students were classified as Convergents who relied more on active experimentation (AE) mode of learning ($M =$

34.29), combined with abstract conceptualization (AC) mode of learning ($M = 27.94$). The two learning style modes (AE, AC) comprise the dominant learning style of Converger. These type of students prefer to learn by finding practical uses for ideas and theories.

The mean score for the students' learning modes are displayed in Table 8.

Table 8

Mean Scores For Students' Learning Modes (n = 184)

Learning mode	<u>M</u>	<u>SD</u>
Concrete Experience	21.45	7.70
Reflective Observation	31.21	8.00
Abstract Conceptualization	27.94	7.10
Active Experimentation	34.29	7.40

Note.

Scores range from 12 - 48

In summary, the students as a group scored highest on the Active Experimentation mode ($M = 34.29$) and lowest on the Concrete Experience mode ($M = 21.45$). This indicates that students were more likely to take a practical approach, and to place emphasis on what really worked as opposed to simply watching situations. The students were also likely to value getting things done and seeing the results of their influence and ingenuity.

The majority of teachers (40%) identified Accommodator

as their dominant learning style. The Accommodators were followed by Assimilators (30%), Convergents (20%), and Divergers (10%). The teachers' dominant learning styles are displayed in Table 9 and the mean scores on the learning modes are shown in Table 10.

Table 9

Teachers' Dominant Learning Style (n = 10)

Learning styles	f	%
Accommodator	4	40
Diverger	1	10
Converger	2	20
Assimilator	3	30
Total	10	100

The mean scores for the four learning modes for the teachers show that the majority of the teachers (40%) relied more on active experimentation mode of learning ($M = 32.00$), combined with concrete experimentation learning mode ($M = 27.50$). The two learning style modes (AE, CE) comprise the dominant learning style of Accommodator. These teachers prefer to learn primarily from hands-on experience, carrying out plans and involving themselves in new and challenging experiences.

Approximately 30 percent of the teachers relied more on abstract conceptualization mode of learning ($M = 30.60$),

combined with reflective mode of learning ($M = 29.80$). The two learning modes (AC, RO) comprise the dominant learning style of Assimilator. These teachers prefer to learn by putting a wide range of information into concise, logical form.

Twenty percent of the teachers relied more on active experimentation mode of learning ($M = 32.00$), combined with abstract conceptualization learning mode ($M = 30.60$). The two learning style modes (AE, AC) comprise the dominant learning style of Converger. These teachers prefer to learn by finding practical uses for ideas and theories.

The remaining 10 percent of the teachers population relied more on reflective observation mode of learning ($M = 29.80$), combined with concrete experience mode of learning ($M = 27.50$). The two learning modes (RO, CE) comprised the dominant learning style of Diverger. These teachers prefer to learn by viewing concrete situations from different points of view, and by observing situations rather than taking action.

A comparison between the teachers' learning styles and those of the students indicated that the highest discrepancy was among the Divergers. Twenty nine percent (29%) of the students were identified as Divergers, while only ten percent (10%) of the teachers were identified as Divergers. This suggests that 29% of the students were more likely than teachers to prefer learning by viewing concrete situations

from different points of view and by observing situations rather than taking action.

In summary, the teachers as a group scored the highest on the Active Experimentation mode (\bar{m} = 32.00) and lowest on the Concrete Experience mode (\bar{m} = 27.50). Like the students, the teachers were more likely to be practical in their approach and to be concerned with what really works as opposed to simply watching situations.

Table 10

Mean Scores For Teachers' Learning Modes (n = 10)

Learning mode	M	SD
Concrete Experience	27.50	10.27
Reflective Observation	29.80	8.52
Abstract Conceptualization	30.60	9.36
Active Experimentation	32.00	7.23

Note.

Scores range from 12 - 48

The following research hypothesis was related to
Research Question 1:

Hypothesis 1: There is a difference in the learning styles of the students participating in the study and the faculty involved in teaching them.

A t -test for dependent (correlated) means was calculated to compare the students' scores on all four modes of learning

with the teachers' scores on the four learning modes. The purpose of the comparison was to ascertain if the differences between the students' and teachers' learning mode means were statistically significant. The results of the analysis are shown in Table 11.

Table 11

Mean Scores for Students' and Teachers' Learning Modes

Learning mode	Teacher ($n = 10$)		Student ($n = 184$)		Mean Diff	Paired t	r
	M	SD	M	SD			
CE	27.50	10.27	26.45	7.70	2.54	2.76*	-.03
RO	29.80	8.52	31.21	8.02	-1.65	-2.16*	.12
AC	30.60	9.36	27.93	7.10	2.98	3.70*	.08
AE	32.00	7.23	34.29	7.42	-3.82	-4.95*	-.03

Note.* $p < .05$

The means and the standard deviations for teachers were based on the total number of teachers ($n = 10$). The teacher-student pairs of scores contrasted with the t -test were based on the total number of paired scores ($n = 184$)

Abbreviations:

CE (Concrete Experience), RO (Reflective Observation), AC (Abstract Conceptualization), AE (Active Experimentation)

There were significant differences in all of the four learning modes. The results indicated that the students' means on RO ($t = -2.16$), and AE ($t = -4.95$) were significantly higher than their teachers' means on the same subscales. The highest agreement between students and the

teachers was on the Reflective Observation mode ($\bar{x} = .12$), while the lowest was on Concrete Experience ($\bar{x} = -.03$). The greatest difference between the means of the students and the teachers was on the subscale AE ($t = -4.95$). The means of the students were significantly greater, with a difference of 3.82 between the means. This indicates that students were more likely than teachers to view issues from different perspectives, look for the meaning of things, and to experiment with changing situations.

Teachers' means were significantly higher on CE ($M = 28.99$) and on AC ($M = 30.92$) subscales. This suggests that teachers were more likely than students to learn from specific experiences, to relate to people and to use logic and ideas rather than feelings to understand problems or situations. The null hypothesis associated with research hypothesis 1 was rejected. There were significant differences between the students' and the teachers' learning styles on all four learning modes.

Research Question 2: What are the students' and faculty perceptions of the classroom environment in the colleges participating in the study?

In order to determine the faculties and students' perceptions of the classroom environment, the scores of both students and their teachers were compared. The student scores on the actual form of the ACES were paired with their teachers' scores on the actual form. Both sets of scores

are displayed in Table 12. An analysis of the paired differences of the seven subscales of ACES indicated significant discrepancies between teachers' and students' scores. The teachers' means ($M = 26.27$) and the students' means ($M = 24.02$) were highest for Teacher Support. This indicated that both the teachers and the students selected Teacher Support as the most prevalent element of the actual classroom environment. The teachers selected Affiliation as the second most prevalent element in the actual classroom environment, while the students viewed Organization and Clarity as the second prevalent element in the actual classroom environment. The teachers placed Organization and Clarity as third, whereas, the students placed Affiliation as third. Both students and teachers selected Task Orientation, Personal Goal Attainment, Involvement, and Student Influence as fourth, fifth, sixth, and seventh, respectively.

Table 12

Teacher and Student Perception of The Actual Classroom Environment

Subscale	Teacher (n = 10)		Student (n = 184)		Mean Diff	Paired t	r
	M	SD	M	SD			
IN	20.90	2.33	20.08	3.94	0.82	3.33*	.54
AF	23.60	2.91	22.02	3.17	1.72	1.51*	.30
TS	26.00	2.26	24.02	3.22	2.26	8.46*	.12
TO	21.50	1.96	20.79	2.47	0.59	2.87*	.14
PG	20.90	2.23	20.10	3.07	0.90	3.08*	-.17
OC	22.90	3.11	22.61	3.21	-0.12	-0.38	.01
SI	19.10	2.51	18.02	2.78	1.37	5.53*	.15

Note.

* $p < .05$

The means and the standard deviations for teachers were based on the total number of teachers (n = 10). The teacher-student pairs of scores contrasted with the t-test were based on the total number of paired scores (n = 184). Abbreviations: IN (Involvement), AF (Affiliation), TS (Teacher Support), TO (Task Orientation), PG (Personal Goal Attainment), OC (Organization and Clarity), SI (Student Influence)

The following research hypothesis was related to Research Question 2:

Hypothesis 2a: There is a difference in the perception of the actual classroom environment by the students and faculty who taught the class.

A t-test for dependent (correlated) means was calculated to compare each teacher's score on the actual form of ACES with

the actual score for each student in the class to determine if they were statistically different. All the tests were conducted using a .05 level of significance. The results are presented in Table 12. The highest score possible for each subscale was 28.

Of the seven subscales, statistical differences between the students' and their teachers' score were evident for six subscales. The only exception was Organization and Clarity. The t -values for Involvement (3.33), Affiliation (6.51), and Task Orientation (2.87) showed that teachers perceived more involvement by students in the classroom activities, more affiliation among the students, and more attention to the tasks of the course than students did. Similarly, the t -test for Teacher Support ($t = 8.46$), Personal Goal Attainment ($t = 3.08$), and Student Influence ($t = 5.53$) also indicated that the teachers' view of these subscales was significantly higher than the view of the students. The results for Organization and Clarity ($t = -0.38$) indicated that there was no significant difference between the students' and teachers' perception of organization and clarity of the classroom activities. The correlation between teacher and student scores was lowest ($r = .01$) for Organization and Clarity. The highest agreement was in the Involvement subscale ($r = .54$). The null hypothesis associated with research hypothesis 2a was rejected. There was significant difference in the perception of classroom

environment by the students and teachers on all subscales except one, Organization and Clarity. These results parallel the results of previous investigations. For example, a comparison of students' and teachers' perceptions of the actual classroom environment by Darkenwald showed that teachers perceived interpersonal dimensions of Affiliation and Teacher Support as more characteristic of their classrooms than did the students. Darkenwald's results indicated a significant difference for Personal Goal Attainment, but none for Task Orientation and Student Influence (Darkenwald, 1987).

Students' perception of the ideal classroom environment and teachers' perceptions of the actual classroom environment were similar on several subscales. The means are displayed in Table 13. The means for both students and teachers were highest for Teacher Support. The students ranked the remaining subscales for their view of the ideal classroom environment as follows: Organization and Clarity, Involvement, Affiliation, Personal Goal Attainment, Task Orientation, and Student Influence. The teachers ranked the remaining subscales for their view of the actual classroom environment in a slightly different order. The order of their ranking was as follows: Affiliation, Organization and Clarity, Task Orientation, Personal Goal Attainment, Involvement, and Student Influence.

Table 13

Teacher Perceptions of the Actual Classroom Environment and Student Perception of the Ideal Classroom Environment

Subscale	Teachers Actual ($n = 10$)		Students Ideal ($n = 184$)		Mean Diff	Paired t	r
	M	SD	M	SD			
IN	20.90	2.33	24.15	3.44	-3.25	-11.45*	.18
AF	23.60	2.91	22.78	2.87	.96	3.62*	.21
TS	26.00	2.26	25.63	3.04	.64	2.36*	-.01
TO	21.50	1.96	20.97	2.30	.40	1.92*	-.00
PG	20.90	2.23	22.67	2.93	-1.67	-6.38*	-.01
OC	22.90	3.11	24.59	3.18	-2.09	-6.25*	-.13
SI	19.10	2.51	20.61	3.06	-.22	-4.41*	.07

Note.* $p < .05$

The means and the standard deviations for teachers were based on the total number of teachers ($n = 10$). The teacher-student pairs of scores contrasted with the t -test were based on the total number of paired scores ($n = 184$)

Abbreviations:

IN (Involvement), AF (Affiliation), TS (Teacher Support), TO (Task Orientation), PG (Personal Goal Attainment), OC (Organization and Clarity), SI (Student Influence)

The following research hypothesis was also related to Research Question 2.

Hypothesis 2b: There is a difference in students' perception of the ideal classroom environment and their teachers' perception of the actual classroom environment.

In order to compare each student's scores on the ideal form of ACES with his or her teachers' scores on the actual form of ACES, a t -test for dependent (correlated) means was calculated. The results are shown in Table 13.

The highest correlations between teacher and student scores were on Affiliation subscale, and Involvement ($r = .21$), while the lowest ($r = .00$) was on Task Orientation subscale. The results indicated that the greatest difference between the means of the students and the teachers was on the subscale, Involvement ($t = -11.45$). The students' ideal means on Personal Goal Attainment ($t = -6.38$), Organization and Clarity ($t = -6.25$) and Student Influence ($t = -4.41$) were significantly higher than their teachers' actual means. Also, the means of the students were significantly greater, with a difference of 3.25 between the means. On Affiliation ($t = 3.62$), Teacher Support ($t = 2.36$), and Task Orientation ($t = 1.92$), teachers actual means were significantly higher than the ideal means of the students. The null hypothesis associated with research hypothesis 2b was rejected on all subscales. There was a difference in the students' perception of the ideal classroom environment and the teachers' perception of the actual.

Also, the following research hypothesis was related to Research Question 2:

Hypothesis 2c: There is a difference in students'

perceptions of the actual and ideal classroom environment.

A t -test for dependent (correlated) means was calculated to compare all students' scores on the actual form of ACES with their scores on the ideal form. The purpose of this comparison was to determine if the differences between the actual and the ideal means were statistically significant. The results of the analysis are displayed in Table 14. The correlation between actual and ideal scores was highest on Teacher Support ($r = .57$), while the lowest was on Student Influence ($r = .29$). Significant differences were in evidence on all dimensions except Task Orientation. Students' ideal means were significantly higher than their actual means for involvement ($t = -12.80$), Affiliation ($t = -3.31$), Teacher Support ($t = -.7.51$), Personal Goal Attainment ($t = -11.18$), Organization and Clarity ($t = -8.11$), and Student Influence ($t = -10.09$). The students' ideal mean for Task Orientation was higher than that of their actual mean, although the difference was not statistically significant. The null hypothesis associated with research hypothesis 2c was rejected. There was significant difference in the students' perception of the actual and ideal classroom environment on all subscales except one, Task Orientation.

Table 14

Students' Actual and Ideal Perception of the Classroom Environment

Subscale	Actual		Ideal		Mean Diff	Paired t	r
	M	SD	M	SD			
IN	20.08	3.94	24.15	3.44	-4.07	-12.80*	.32
AF	22.02	3.17	22.78	2.87	-.76	-3.31*	.47
TS	24.02	3.22	25.63	3.04	-1.61	-7.51*	.57
TO	20.79	2.47	20.97	2.30	-.18	-.93	.36
PG	20.10	3.07	22.67	2.93	-2.57	-11.18*	.46
OC	22.61	3.21	24.59	3.18	-1.97	-8.11*	.47
SI	18.02	2.78	20.61	3.06	-2.59	-10.09*	.29

Note.

* $p < .05$

$n = 184$

Abbreviations:

IN (Involvement), AF (Affiliation), TS (Teacher Support)

TO (Task Orientation), PG (Personal Goal Attainment)

OC (Organization and Clarity), SI (Student Influence)

Research Question 3: What are the students' perceptions of the classroom environment when their learning styles are matched with their teachers?

The following research hypothesis was also related to Research Question 3:

Hypothesis 3a: There is a difference in the students' perception of the actual classroom environments when students' learning styles are matched or mismatched with

their teachers' learning style.

A t -test for independent groups was calculated to compare matched and mismatched students on their perceptions of the actual classroom environment. The students were defined as "matched" if they had the same learning style type as their teacher. If they did not have the same learning style type as their teacher, they were defined "mismatched." The comparison of the matched and mismatched students is displayed in Table 15.

Table 15

Students' Mean on ACES Actual When Matched and Mismatched

Subscale	Matched ($n = 58$)		Mismatched ($n = 126$)		t
	M	SD	M	SD	
IN	19.50	3.45	20.34	4.14	-1.35
AF	21.76	2.23	22.13	3.52	-.75
TS	23.84	3.32	24.09	3.18	-.49
TO	20.43	2.12	20.95	2.06	-1.33
PG	19.69	3.08	20.29	3.06	-1.22
OC	22.55	2.62	22.64	3.46	-.18
SI	17.53	2.77	18.25	2.77	-1.62

Note.

$n = 58$ (match), 126 (mismatch)

Abbreviations:

IN (Involvement), AF (Affiliation), TS (Teacher Support),
TO (Task Orientation), PG (Personal Goal Attainment),
OC (Organization and Clarity), SI (Student Influence)

Matched and Mismatched students' showed agreement on the way they perceived the actual classroom environment by ranking five subscales in the same order of their importance. The means for both students who matched and who did not match their teachers learning styles were highest for Teacher Support and Organization and Clarity. Matched students ranked the remaining subscales for their view of the actual classroom environment as follows: Affiliation, Task Orientation, Personal Goal Attainment, Involvement, and Student Influence. The mismatched students ranked the remaining subscales in the following order: Affiliation, Task Orientation, Involvement, Personal Goal Attainment, and Student Influence. The results indicated that there was no significant difference in the perception of the actual classroom environment between students' whose learning styles matched their teachers and students' whose learning styles did not match with their teachers. The null hypothesis associated with research hypothesis 3a, was retained. Whether the students matched or did not match their teachers' learning style, they viewed Teacher Support and Organization and Clarity as the most important element of the actual classroom environment.

The following research hypothesis was also related to Research Question 3:

Hypothesis 3b: There is a difference in the perception of the ideal classroom environment when

students' learning styles are matched or mismatched with their teachers' learning style.

A t -test for independent means was calculated to compare the matched and the mismatched groups on their ideal perception of the classroom environment. The analysis of the groups' ideal perception is displayed in Table 16.

Table 16

Students' Mean on ACES Ideal When Matched and Mismatched

Subscale	Matched ($n = 58$)		Mismatched ($n = 126$)		t
	M	SD	M	SD	
IN	23.48	3.77	24.45	3.25	-1.78*
AF	22.71	3.02	22.81	2.80	-.23
TS	25.17	3.33	25.84	2.88	-1.39
TO	20.33	2.43	21.27	2.19	-2.62*
PG	22.05	2.99	22.95	2.87	-1.95*
OC	23.84	3.04	24.93	3.19	-2.17*
SI	20.31	3.33	20.75	2.93	-.90

Note.

* $p < .05$

$n = 58$ (match), 126 (mismatch)

Abbreviations:

IN (Involvement), AF (Affiliation), TS (Teacher Support),
TO (Task Orientation), PG (Personal Goal Attainment),
OC (Organization and Clarity), SI (Student Influence)

The perception of the matched and mismatched students of the ideal classroom environment indicated agreement on the ranking of four subscales in order of their importance. There was no agreement on two subscales. The means for both matched ($M = 25.17$) and mismatched ($M = 25.84$) students were highest for Teacher Support. Matched students ranked the remaining subscales in the following order: Organization and Clarity, Involvement, Affiliation, Personal Goal Attainment, Task Orientation, and Student Influence. The mismatched students ranked the remaining subscales for their view of the ideal classroom environment as follows: Organization and Clarity, Involvement, Personal Goal Attainment, Affiliation, Task Orientation, and Student Influence. The results indicated significant discrepancies in all subscales except Affiliation, Teacher Support, and Student Influence. This indicates that the mismatched students were more likely than the matched students to feel the need for more Involvement, Task Orientation, Personal Goal Attainment, and Organization and Clarity for an ideal classroom environment. Although there were no statistically significant discrepancies on Affiliation, Teacher Support, and Student Influence, the mismatched students had higher means for those dimensions than the matched students. The null hypothesis associated with research hypothesis 3b was rejected on four of the subscales. There was significant difference in the perception of the ideal classroom

environment when students' learning styles matched or mismatched their teachers. Students who had learning styles different from their teachers had ideal scores that were higher than their teachers.

Similarly, the following research hypothesis was related to Research Question 3:

Hypothesis 3c: There is a difference between matched and mismatched students' differences on the ideal and actual scores of the ACES.

A t -test for two independent groups on difference scores was computed. Involvement difference scores were computed by subtracting ACES actual scores on involvement from the ACES ideal scores on involvement. Similarly, Affiliation, Teacher Support, Task Orientation, Personal Goal Attainment, Organization and Clarity, and Student Influence difference scores were computed by subtracting ACES actual scores from the ideal ACES scores on each subscale. The results are displayed in Table 17.

Table 17

Students' Mean on Difference Score When Matched and Mismatched

Subscale Difference score	Matched ($n = 58$)		Mismatched ($n = 126$)		t
	M	SD	M	SD	
IN	3.98	4.65	4.11	4.17	-.19
AF	.95	2.81	.67	3.26	.55
TS	1.33	3.09	1.75	2.83	-.90
TO	-.10	2.98	.32	2.55	-.98
PG	2.36	3.13	2.67	3.12	-.61
OC	1.29	2.90	2.29	3.43	-1.91*
SI	2.78	3.96	2.50	3.25	.50

Note.

* $p < .05$

Abbreviations:

IN (Involvement), AF (Affiliation), TS (Teacher Support), TO (Task Orientation), PG (Personal Goal Attainment), OC (Organization and Clarity), SI (Student Influence)

The results indicated that means for difference scores of the mismatched students were higher than those of matched students in five subscales. Of the seven subscales of ACES, only Organization and Clarity was statistically significant. This indicates that the mismatched students felt a greater discrepancy between ideal classroom environment and what currently exists than the matched students. The null hypothesis associated with research hypothesis 3c was rejected on one subscale.

Research Question 4: Is there a relationship between learning style differences and assessment of the actual classroom environment by students?

The research hypothesis designed to answer this question focused on the relationships between the differences of the students' and teachers' learning modes and the actual classroom environments.

Hypothesis 4: There is a relationship between learning style differences and the assessment of the actual classroom environment by students.

In order to determine the relationships between the learning style differences and student perception of the classroom environment, the difference between the teachers' scores on Concrete Experience (CE) and the students score on CE was computed. Differences were also computed for the other three learning modes of Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE). A Pearson Product Moment correlation was calculated to determine the relationships between the differences in learning style modes and students' perception on the seven dimensions of the actual form of ACES. The results are displayed in Table 18.

Table 18

Correlations Between Learning Style Differences and Actual
ACES dimensions

Subscales	Learning style differences			
	CEdiff	ROdiff	ACdiff	AEdiff
IN	.03	-.11	.02	.02
AF	-.07	-.10	.02	.13
TS	.05	-.09	-.03	-.00
TO	-.02	.11	-.04	-.10
PG	.08	-.12	-.09	.07
OC	-.11	.04	.05	.00
SI	.06	-.16	.01	.08

Note.

Abbreviations:

IN (Involvement), AF (Affiliation), TS (Teacher Support)
 TO (Task Orientation), PG (Personal Goal Attainment)
 OC (Organization and Clarity), SI (Student Influence)
 CE (Concrete Experience), RO (Reflective Observation)
 AC (Abstract Conceptualization), AE (Active Experimentation)

The correlation between AE difference and Affiliation ($r = .13$) was the highest; the lowest was between AE difference and Teacher Support ($r = -.00$). There were no relationships or only very weak ones between learning style differences and ACES dimensions on all scales. None of the correlations were statistically significant. The null hypothesis associated with research Hypothesis 4 was retained.

Correlations were also calculated to determine the

relationships between students' ratings on the seven subscales of the actual classroom environments. The results are displayed in Table 19. The correlation between Involvement and Organization and Clarity ($r = .69$) was the highest, followed by Affiliation and Involvement ($r = .67$). The lowest correlation was between Task Orientation and Student Influence ($r = .14$). There were significant relationships between all classroom dimensions except Task Orientation and Student Influence.

Table 19

Correlations Between Students' Actual ACES Dimensions

	ACES Dimensions						
	IN	AF	TS	TO	PG	OC	SI
IN	1.00	.67	.57	.24	.55	.69	.44
AF	.67	1.00	.55	.30	.55	.57	.40
TS	.57	.55	1.00	.36	.66	.65	.34
TO	.24	.30	.36	1.00	.31	.35	.14
PG	.55	.55	.66	.31	1.00	.60	.45
OC	.69	.57	.65	.35	.60	1.00	.28
SI	.44	.40	.34	.14	.45	.28	1.00

Note.

Abbreviations:

IN (Involvement), AF (Affiliation), TS (Teacher Support)
 TO (Task Orientation), PG (Personal Goal Involvement)
 OC (Organization and Clarity), SI (Student Influence)

Research Question 5: What are the perceptions of men and women students of the actual classroom environment?

The following research hypothesis was related to Research Question 5:

Hypothesis 5: There is a difference between men and women students' perception of the actual classroom environment.

A t -test for independent means was calculated to compare the means of the men students on the actual form of ACES with the means of the women students on the actual form. Table 20 displays a comparison of men and women students' perceptions of the actual classroom environment. Although the differences were not statistically significant, the actual means for men were higher than the means for women on all subscales except Task Orientation. The greatest gender difference in the perceptions of the actual classroom environment was on Organization and Clarity. The null hypothesis associated with research Hypothesis 5 was retained. There was no significant difference between men and women students' perception of the actual classroom environment.

Table 20

Men and Women Students' Perception of the Actual Classroom Environment

Subscale	Men ($n = 58$)		Women ($n = 126$)		t
	M	SD	M	SD	
IN	20.40	4.16	19.93	3.85	.75
AF	22.12	3.51	21.97	3.01	.30
TS	24.41	3.30	23.83	3.18	1.14
TO	20.57	2.89	20.87	2.23	-.82
PG	20.19	3.12	20.06	3.06	.27
OC	23.06	3.25	22.41	3.19	1.26
SI	18.24	2.83	17.92	2.76	.73

Note.

men ($n = 58$) women ($n = 126$)

Abbreviations:

IN (Involvement), AF (Affiliation), TS (Teacher Support)

TO (Task Orientation), PG (Personal Goal Attainment)

OC (Organization and Clarity), SI (Student Influence)

Research Question 6: What are the perceptions of men and women students of the ideal classroom environment?

The following research hypothesis was related to

Research Question 6:

Hypothesis 6: There is a difference between men and women students' perception of the ideal classroom environment.

A t -test for independent means was calculated to compare the means of the men students on the ideal form of ACES with the

means of the women students on the ideal form. Table 21 provides the results of the t -test.

The results revealed that men and women students' views of the ideal classroom environment were different. The means of the women on the ideal form of ACES were significantly higher on all subscales except on Task Orientation. This indicates that women students were more likely than men students to prefer more Involvement, Affiliation, Teacher Support, Personal Goal Attainment, Organization and Clarity, and Student Influence for an ideal classroom environment. The greatest difference between men and women students' means was on Affiliation ($t = 2.59$). The null hypothesis associated with research hypothesis 6 was rejected. There was significant difference between men and women students' perception of the ideal classroom environment on all subscales, except on Task Orientation.

Table 21

Men and Women Students' Perception of the Ideal Classroom Environment

Subscale	Men ($n = 58$)		Women ($n = 126$)		t
	M	SD	M	SD	
IN	23.40	3.89	24.49	3.17	-2.02*
AF	21.98	3.30	23.14	2.57	-2.59*
TS	24.91	3.74	25.96	2.61	-2.19*
TO	20.39	2.63	21.06	2.14	-.72
PG	21.86	3.12	23.04	2.78	-2.57*
OC	23.89	3.70	24.91	2.86	-2.07*
SI	19.79	3.27	20.98	2.90	-2.49*

Note. * $p < .05$

men ($n = 58$) women ($n = 126$)

Abbreviations:

IN (Involvement), AF (Affiliation), TS (Teacher Support)

TO (Task Orientation), PG (Personal Goal Attainment)

OC (Organization and Clarity), SI (Student Influence)

CHAPTER 5

Summary of Findings, Recommendations, and Implications

This chapter contains a summary of findings, recommendations, and implications. These are based on the analysis of data presented in Chapter Four and the literature reviewed in Chapter Two.

Summary of FindingsPredominant Learning Styles

The predominant learning style for both students and teachers was Accommodator. Accommodators learn primarily from hands-on experience. At the same time, Accommodators enjoy carrying out plans and involving themselves in new and challenging experiences. In solving problems, Accommodators tend to act on "gut" feelings rather than on logical analysis (Kolb, 1985).

The second dominant learning style reflected some interesting differences. The teachers reported Assimilator as their second dominant style, while the students reported Diverger as their second dominant style. This indicated that although the teachers tend to learn in the same way as the students, they also incorporate logical thinking, systematic planning, and intellectual understanding in their learning behavior. On the contrary, the students preferred to learn by viewing concrete situations from many different points of view and to observe without taking action. These findings suggest that teachers in the colleges of teacher

education should endeavor to encourage their students to incorporate more logical thinking, systematic planning and intellectual understanding of situations in their learning habits. By making learning through thinking a priority, the students would be better prepared in their careers as teachers.

The teachers were higher than their students in all learning types except Diverger. This indicated that the majority of teachers in colleges of teacher education do not like observing situations without taking action.

Perceptions of the Actual Classroom Environment

Both students and teachers viewed Teacher Support as the most prevalent dimension of the actual classroom environment. The students ranked Organization and Clarity, Involvement, and Affiliation as second, third, and fourth respectively in the actual classroom. The teachers placed Affiliation, Organization and Clarity, and Task Orientation as second, third, and fourth respectively in the actual classroom. Both groups agreed on one subscale, Personal Goal Attainment as fifth. Students placed Task Orientation as sixth, while the teachers placed Involvement as sixth. Again, there was agreement on the order of the last subscale, Student Influence. Darkenwald's (1987) research on ACES revealed some similarities in the findings for students' and teachers' rankings of ACES subscales. Both students and teachers selected Teacher Support as the most

prevalent dimension of the actual classroom environment, and Student Influence as the least noticed dimension of the actual classroom environment.

A comparison of the students' views of the actual classroom environment with those of the teachers indicated that the teachers viewed every subscale of ACES except Organization and Clarity more favorably than did the total group of students. The teachers saw their classroom as places in which students were more actively involved in the class activities and more interactive with each other than students reported. Similarly, the teachers focused their attention on students' accomplishments, and emphasis on planning classes which were structured with clearly disseminated information.

When students' perception of Organization and Clarity was compared with their teachers, the results indicated no difference between the students' and teachers' perception of the classroom activities. Similarly, when women and men students' perception of the actual classroom environment were compared, the results indicated no difference in their perception of the actual classroom environment.

Matched and mismatched students did not differ in their perception of the actual classroom environment. One reason may be that the mismatched students struggled more to understand the teacher and sought more clarity, thus, neutralizing any mismatched effect. This finding may

suggest a need for teachers in colleges for teacher education to be aware of students whose learning styles are different from theirs in order to help them in their efforts to achieve their goals.

An assessment of the relationships between learning style differences and the actual classroom environment by students revealed only weak relationships or none at all. Correlations between students' ratings on the seven subscales of the actual classroom environments were found. Significant relationships between Involvement and Organization and Clarity, and Involvement and Affiliation were realized. This suggests that the more students participate actively and attentively in activities, the more they will perceive Organization and Clarity.

Perceptions of an Ideal Classroom Environment

A comparison of the order of the subscales for students' perceptions of the ideal classroom environment and teachers' views of the actual classroom environment revealed that both students and teachers selected Teacher Support as the most important element in the actual and ideal classroom environments. Teachers perceived this element as more characteristic of their classrooms than did students, in fact, even more so than the students conceived it as the ideal. It seems that teachers tend to over-rate the extent of their own supportive behavior in their classrooms.

Students perceived ideal classroom more favorably than

the teachers did in the actual. Significant differences were found in all the subscales. These results parallel those of Darkenwald (1987).

Matched and mismatched students' perception of the ideal classroom environment differed in that mismatched students perceived a greater need for more Involvement, Task Orientation, Personal Goal Attainment, and Organization and Clarity.

An analysis of both men and women students' perception of the ideal classroom environment indicated a need to increase all classroom environment characteristics in the ideal classroom. They both wanted a classroom with more Involvement, Affiliation, Teacher Support, Personal Goal Attainment, Organization and Clarity, and Student Influence. Although both men and women students agreed on the order of the subscales, women expressed a higher ideal level.

Ideal Classroom Environment Needs

Despite the agreement in the hierarchical order in which the students and teachers respectively ranked the ideal and the actual subscales for classroom environment, a comparison of the students' views of the ideal classroom environment with the teachers' views of the actual classroom environment identified students' needs. Students preferred ideal classroom environments in which they could be actively involved in the learning process. They indicated that they wanted activities which would allow them to interact with

other students and with their teachers. Also, the students indicated that they wanted activities which were planned flexibly enough to allow them to explore personal interests in relation to their courses. At the same time, having some choices within the activities would satisfy their expressed need for influence in the class. Just as the students struggle to gain control over their lives in the real world, so it is the same for them in their struggle to gain control over their classroom world.

Conclusions

The dominant learning styles for both students and teachers was Accommodator. Students preferred Diverger as their second dominant style, while this style was the least preferred by the teachers. Significant differences were found in all of the four learning styles.

The teachers when compared with students, tend to over-rate all the aspects of the actual classroom environment, except Organization and Clarity. The differences were statistically significant. The students ratings of the ideal classroom were higher than those of the teachers actual. These differences were statistically significant. This implies that the students in colleges for teacher education perceive ideal environment differently from what currently exists.

Matching students with their teachers was not found to be related to the ratings of the seven subscales of the

actual classroom environment. This may suggest a need for teachers to be flexible in their styles in order to meet the needs of all students. Significant differences existed in Involvement, Task Orientation, Personal Goal Attainment, and Organization and Clarity when matched and mismatched students were rated on the seven subscales of the ideal classroom environment.

Learning style differences were not found to be related to the ratings of the seven subscales of the actual classroom environment. Significant relationships were found to exist between students' ratings on the seven subscales of the actual classroom environment.

There were no significant differences found when men and women students' perceptions of the actual environments were compared. A comparison of men and women students' perception of the ideal classroom environment was found to be significantly different on all subscales, except Task Orientation.

Recommendations for Tennessee Association of Colleges For Teacher Education

1. Teachers should endeavor to identify the learning styles of their students in a systematic way by using a learning style inventory. Identification of the learning styles would provide the students not only with profiles of their preferred approach of learning, but would give an indication of other learning styles which they can assume in

situations which require other approaches.

2. Extensive support for Kolb's formulation of experiential learning theory shows the favorable uses of the theory, which may be implemented for teacher education, are: the development of educator knowledge and the modification and expansion of educator methods and techniques which align with Kolb's learning cycle and its relationship to the growth and development of students in teacher education.

3. A replication of this study may be needed that uses a more diverse population to see whether there will be a difference in perception of classroom environments among a larger and more heterogenous group.

4. Teachers should plan content related classroom activities or outside activities which encourage student-teacher interaction and student-student interaction.

5. Training of teachers in teacher education should focus on both learning styles and classroom environment.

6. Teachers should be explicit in their assignments. They should make sure that students know and understand their responsibilities.

Implications

1. Further research is needed to identify other factors that may have lead matched and mismatched students to have similar views of the classroom environment.

2. Further research is needed to determine if a match between students' learning styles and teacher learning style

will lead to better academic performances.

3. Teachers may utilize Kolb's experiential learning theory in order to be more flexible in their instructional methods.

4. Research is needed to determine if increased emphasis on learning styles and classroom environment needs contributes to student achievement and satisfaction in school work.

5. Colleges of Teacher Education may plan their programs with students' learning style and classroom environment needs as guiding elements.

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APPENDICES

APPENDIX A
FOUNDATIONS CLASSES SURVEYED AND COURSE DESCRIPTIONS

East Tennessee State University

Course Title: Curriculum and Instruction CUI 3301. The School II

Course Description: Historical, philosophical, and socio-cultural foundations for teaching are stressed. Special emphasis is accorded issues in multi-cultural education.

Milligan College

Course Title: Education 408. Secondary School Foundations

Course Description: History, philosophy and social foundations of secondary education. Characteristics of adolescents, legal aspects of teaching, organization of schools and the curriculum of secondary schools is discussed.

King College

Course Title: Philosophy of Education 301

Course Description: This course is designed to provide students with broad background and basic understanding of philosophical foundations of American education with a particular attention to its historical, political, sociological, and policy studies implication.

Carson-Newman College

Course Title: Education 303. Foundations of Education

Course Description: Survey - - historical, sociological, and philosophical foundations of American education.

Tusculum College

Course Title: Education 200. History and philosophy of education

Course Description: Historical and philosophical foundations of American education. Ethical and legal issues in education, socio-logical and cultural issues in teaching profession.

Wesleyan College

Course Title: Education 201. Foundations of education and curriculum development

Course Description: Study of the influence of historical, philosophical, and sociological factors on the development of American education. Emphasis is given to the analysis of contemporary education theory and practice, and role of school in American society.

Maryville College

Course Title: Education 309. Professional Seminar on Teaching

Course Description: This course is designed to provide new members of the profession with identity as teachers. Self reflection on the practices of teaching, multiple context of teaching - multi-cultural issues, sociological and cultural foundations for teaching.

APPENDIX B
ADULT CLASSROOM ENVIRONMENT SCALE

ADULT CLASSROOM ENVIRONMENT SCALE

Thank you in advance for taking time to complete the questionnaire carefully. Your opinions are most important and will help us improve future courses.

Section 1. Please respond to the following 49 items according to your ACTUAL view of this class you are currently attending. This is not a test. There are no right or wrong answers. Please give you honest opinions about the class you are attending now. Your answers are confidential.

Read each statement carefully and decide how well it describes the class you are now attending.

Mark your answer either 1, 2, 3, or 4 on the test form provided.

Disagree Strongly.....1
 Disagree.....2
 Agree.....3
 Agree Strongly.....4

-If you change your mind, carefully erase your first response and record the response you have chosen. Be sure to make only one choice for each statement and to respond to each statement. Please do not leave any blanks.

- | | | | | | |
|----|--|---|---|---|---|
| 1. | Students help to decide the topics to be covered in class. | 1 | 2 | 3 | 4 |
| 2. | The class is flexible enough to meet the needs of individual students. | 1 | 2 | 3 | 4 |
| 3. | The teacher comes to class prepared. | 1 | 2 | 3 | 4 |
| 4. | Students are often bored in class. | 1 | 2 | 3 | 4 |
| 5. | The teacher seldom talks about things not related to the course. | 1 | 2 | 3 | 4 |

6.	Many students think that the class is not relevant to their lives.	1	2	3	4
7.	Students often ask the teacher questions.	1	2	3	4
8.	The students in the class work well together.	1	2	3	4
9.	Learning objectives are made clear at the start of the course.	1	2	3	4
10.	The teacher makes all the decisions in the class.	1	2	3	4
11.	Most students enjoy class.	1	2	3	4
12.	The teacher expects every student to learn the exact same things.	1	2	3	4
13.	Students in the class can select assignments that are of personal interest to them.	1	2	3	4
14.	The teacher makes little effort to help students succeed.	1	2	3	4
15.	The teacher talks down to students.	1	2	3	4
16.	Students regularly meet assignment deadlines.	1	2	3	4
17.	Students often share their personal experiences during class.	1	2	3	4
18.	Students often discuss things not related to course content.	1	2	3	4
19.	Activities not related to course objectives are kept to a minimum.	1	2	3	4

20.	Most students look forward to class.	1	2	3	4
21.	Most students in the class pay attention to what the teacher is saying.	1	2	3	4
22.	The class is well organized.	1	2	3	4
23.	The teacher encourages the students to do their best.	1	2	3	4
24.	Students do a lot of work in the class.	1	2	3	4
25.	A few students dominate the discussions in the class.	1	2	3	4
26.	The class lacks a clear sense of direction.	1	2	3	4
27.	The subject matter is adequately covered.	1	2	3	4
28.	The teacher sticks to the lesson plan regardless of student interest.	1	2	3	4
29.	Most students take part in the class discussions.	1	2	3	4
30.	Students do not know what is expected of them.	1	2	3	4
31.	The students in the class learn little from one another.	1	2	3	4
32.	Most students in class achieve their personal learning goal.	1	2	3	4
33.	The students in the class enjoy working together.	1	2	3	4

34.	The teacher cares about students' feeling.	1	2	3	4
35.	The teacher tries to find out what individual students want to learn.	1	2	3	4
36.	Getting work done is very important in the class.	1	2	3	4
37.	Students participate in setting course objectives.	1	2	3	4
38.	The class is more a social hour than a place to learn.	1	2	3	4
39.	The teacher rarely dominates classroom discussion.	1	2	3	4
40.	The teacher respects students as individuals.	1	2	3	4
41.	Learning activities follow a logical sequence.	1	2	3	4
42.	Students seldom interact with one another during class.	1	2	3	4
43.	Students have the opportunity to learn at their own pace.	1	2	3	4
44.	The teacher likes the students in the class.	1	2	3	4
45.	Students in the class feel free to disagree with one another.	1	2	3	4
46.	Friendships have developed in the class.	1	2	3	4
47.	Students feel free to question course requirements.	1	2	3	4
48.	The teacher cares whether or not the students learn.	1	2	3	4

49. The teacher seldom insists that you do things his or her way. 1 2 3 4

Section 2. Please respond to items 50 - 98 according to your view of an IDEAL class.

Read each statement carefully and decide how well it describes your ideal class. Indicate your opinion by selecting either 1, 2, 3, or 4 on the answer form.

Disagree Strongly.....1
Disagree.....2
Agree.....3
Agree Strongly.....4

If you change your mind, carefully erase your first response and record the response you have chosen. Be sure to make only one choice for each statement and to respond to each and every statement. Please do not leave any blanks.

50. Students help to decide the topics to be covered in class. 1 2 3 4
51. The class is flexible enough to meet the needs of individual students. 1 2 3 4
52. The teacher comes to class prepared. 1 2 3 4
53. Students are often bored in class. 1 2 3 4
54. The teacher seldom talks about things not related to the course. 1 2 3 4
55. Many students think that the class is not relevant to their lives. 1 2 3 4
56. Students often ask the teacher questions. 1 2 3 4
57. The students in the class work well together. 1 2 3 4

58.	Learning objectives are made clear at the start of the course.	1	2	3	4
59.	The teacher makes all the decisions in the class.	1	2	3	4
60.	Most students enjoy class.	1	2	3	4
61.	The teacher expects every student to learn the exact same things.	1	2	3	4
62.	Students in the class can select assignments that are of personal interest to them.	1	2	3	4
63.	The teacher makes little effort to help students succeed.	1	2	3	4
64.	The teacher talks down to students.	1	2	3	4
65.	Students regularly meet assignment deadlines.	1	2	3	4
66.	Students often share their personal experiences during class.	1	2	3	4
67.	Students often discuss things not related to course content.	1	2	3	4
68.	Activities not related to course objectives are kept to a minimum.	1	2	3	4
69.	Most students look forward to class.	1	2	3	4
70.	Most students in the class pay attention to what the teacher is saying.	1	2	3	4
71.	The class is well organized.	1	2	3	4

72.	The teacher encourages the students to do their best.	1	2	3	4
73.	Students do a lot of work in the class.	1	2	3	4
74.	A few students dominate the discussions in the class.	1	2	3	4
75.	The class lacks a clear sense of direction.	1	2	3	4
76.	The subject matter is adequately covered.	1	2	3	4
77.	The teacher sticks to the lesson plan regardless of student interest.	1	2	3	4
78.	Most students take part in the class discussions.	1	2	3	4
79.	Students do not know what is expected of them.	1	2	3	4
80.	The students in the class learn little from one another.	1	2	3	4
81.	Most students in class achieve their personal learning goal.	1	2	3	4
82.	The students in the class enjoy working together.	1	2	3	4
83.	The teacher cares about students' feeling.	1	2	3	4
84.	The teacher tries to find out what individual students want to learn.	1	2	3	4
85.	Getting work done is very important in the class.	1	2	3	4

86.	Students participate in setting course objectives.	1	2	3	4
87.	The class is more a social hour than a place to learn.	1	2	3	4
88.	The teacher rarely dominates classroom discussion.	1	2	3	4
89.	The teacher respects students as individuals.	1	2	3	4
90.	Learning activities follow a logical sequence.	1	2	3	4
91.	Students seldom interact with one another during class.	1	2	3	4
92.	Students have the opportunity to learn at their own pace.	1	2	3	4
93.	The teacher likes the students in the class.	1	2	3	4
94.	Students in the class feel free to disagree with one another.	1	2	3	4
95.	Friendships have developed in the class.	1	2	3	4
96.	Students feel free to question course requirements.	1	2	3	4
97.	The teacher cares whether or not the students learn.	1	2	3	4
98.	The teacher seldom insists that you do things his or her way.	1	2	3	4

APPENDIX C
LETTER OF PERMISSION FOR SCALE

PATRICK N. KARIUKI
 2908 NEWTON ST
 JOHNSON CITY, TN 37604
 (615) 926-4780 (H)

August 26, 1994

Dr. Gordon Darkenwald
 The State University of
 New Jersey Rutgers
 Center for Adult Development
 Graduate School of Education
 10 Seminary Place
 New Brunswick, New Jersey 08903

Dear Dr. Darkenwald,

My name is Patrick Kariuki and I am a doctoral student at East Tennessee State University. I am currently writing my dissertation on the subject "The relationship between student and faculty learning style congruency and their perception of the classroom environment in teacher education classes".

The purpose of my writing is to ask you for the permission to use the Adult Classroom Environment Scale for my dissertation. I am intending to survey approximately 250 subjects.

If you will grant me the permission to use the ACES, I would appreciate it if you could put it in writing for my record. Additionally, I would appreciate it if you could tell me how to obtain all the materials I will need to administer and interpret the ACES.

Thank you in advance for your help on this study.

Sincerely,

Patrick Kariuki

Patrick N. Kariuki

9/9/94
 Dear Mr. Kariuki —
 As I said over
 the phone, I am pleased
 to give you permission to
 use ACES for your
 dissertation research.
 I like your topic & would
 be glad to offer any
 assistance I can. I would
 like, in return, a copy of
 the completed study.
 Dr. Gordon Darkenwald
 Professor of
 Education
 Rutgers U.

APPENDIX D
LEARNING STYLE INVENTORY INFORMATION

KOLB'S LEARNING STYLE INVENTORY

Kolb's Learning Style Inventory (LSI-1985) was used to measure the learning styles of both students and teachers. Kolb developed the LSI on the basis of his model of experiential learning. The LSI is completed by responding to 12 sentences with a choice of four endings. The endings for each sentence is ranked according to how well one thinks each one fits with how one go about learning something. A "4" for the sentence ending that describes how one learns best, down to a "1" for the sentence ending that seems least like the way one would learn.

The LSI can be administered individually or in groups. The inventory may in no way be reproduced or duplicated. The inventory can be purchased from McBer and Company, 116 Huntington Avenue Boston, MA 02116.

APPENDIX E
LETTER OF PERMISSION TO USE LSI

..

M C B E R & C O M P A N Y

Dear Researcher:

This is in response to your letter regarding permission to use the Learning Style Inventory in a research project. Enclosed is a version of the LSI designed specifically for research purposes. It consists of two pages - one is the 12 question inventory and the other is the circle of learning graph and the learning style type grid. The scoring instructions and interpretation are not included. This version is sold in packages of 25 for \$30.00 and the scoring booklet is sold separately for \$7.00 each. A User's Guide which contains statistical data as well as background information on the Learning Style - Inventory is \$50.00. There is an 8% shipping and handling charge also. Permission to use the inventory in your research is automatically given when the materials are purchased from the Training Resources Group at McBer & Company. The inventory may in no way be reproduced or duplicated. Please direct inquiries regarding this issue or your specific project needs to :

Tamara Friedman
Sales & Customer Service Representative
McBer & Company
116 Huntington Avenue
Boston, MA 02116

A brief description of the project and the specifications of any special requests need to be included. If you have questions regarding the inventory or would like to place an order, please contact me at 1-800-729-8074.

Sincerely,


Tammy Friedman
Training Resources Group

APPENDIX F
LETTER FOR CLASSES

**Letter to be read to each class
by the instructor**

For several years, I have been involved in studies that try to identify new ways to help students to succeed in reaching their goals.

Currently, I am a doctoral student at East Tennessee State University and am completing requirements for my Ed.D. Degree in Educational Leadership and Policy Analysis. My dissertation is a study of the relationship between student and faculty learning style congruency and their perception of the classroom environment in teacher education classes. I selected the topic because I believe that I will learn new information which will help more students to succeed in their courses.

I am very interested in your learning style, and your view of the classroom environment of your foundations course. Learning style as defined for my study describes the way you deal with ideas and day-to-day situations in your life. Additionally, Classroom environment is viewed as one that consists of the characteristics and interactions of the students and the instructor. The instruments to be used are the Learning Styles Inventory, (LSI) and Darkenwald's Adult Classroom Environment Scale (ACES).

There are no right or wrong answers for these questionnaires. I am interested in your opinion. Your responses will be anonymous.

The results of the study will be used to suggest teaching approaches designed to encourage students to succeed at meeting their educational goals. Your help will be very valuable.

Thank you very much for completing the LSI and the ACES. Your opinion will make a positive impact on teacher education colleges.

Sincerely,

Patrick N. Kariuki

VITA

PERSONAL

Patrick N. Kariuki
2908 Newton Street
Johnson City, TN 37604

EDUCATION

- 1/85 - 5/89 Lee College; Cleveland, Tennessee
B.A Magna Cum Laude (May, 1989)
Major: Psychology
- 9/89 - 5/91 East Tennessee State University
Johnson City, Tennessee
M.A (May, 1991)
Major: Clinical Psychology
- 9/91 - 5/95 East Tennessee State University
Johnson City, Tennessee
Ed.D (May, 1995)
Leadership and Policy Analysis

EMPLOYMENT

- 1/95 - Present Adjunct Faculty: Milligan College
Johnson City, Tennessee
Courses - Developmental Psychology (2
sections)
Theory and Practice of Counseling and
Psychotherapy
- 9/94 - Present Adjunct Faculty: Walters State Community
College, Morristown, Tennessee
Taught - Developmental Psychology, General
Psychology, and Emotional Psychology
- 6/91 - 12/91 Watauga Mental Health Services
Johnson City, Tennessee
Psychological Examiner/School Psychologist
Testing (Elizabethton City School System)
Individual therapy, and group therapy at
Elizabeth Mental Health Center
- 9/91 - 5/94 East Tennessee State University
Johnson City, Tennessee
Doctoral Fellow: Educational Leadership
Computer lab coordinator - leading focus
groups, workshops in WordPerfect, Harvard
graphics, SPSSPC

Research Assistant - Interpreting/writing
Selection Research Instrument test results,
involved in departmental research

HONORS AND AWARDS

- | | |
|-------------|--|
| 1991 - 1993 | 4 Times recipient of international
academic achievement award at ETSU |
| 5-1992 | PI GAMMA MU- Member of International
Honor Society in Social Sciences |
| 1989 | PSI CHI- Member of Honor Society in
Psychology at ESTU |
| 1985 -1989 | 5 Times Dean's list at Lee College |
| 8-1988 | National Presenter- Psychology Tour
Responsibility - Interviewed B. F.
Skinner, Ulric Neisser, Albert Ellis,
Albert Bandura, and other prominent
psychologists |