A COMPARATIVE ANALYSIS OF LEARNING STYLES OF BLACK AND WHITE COLLEGE FRESHMEN

By

WANDA MARIE JOHNSON

Bachelor of Music Education
Central State University
Edmond, Oklahoma
1970

Master of Education
Central State University
Edmond, Oklahoma
1975

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
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Thesis Approved:

David S. Lerch
Thesis Adviser

L. Lee Scull

Judith E. Dobson

Paul M. Miller

Kenneth St. Clair

Norman N. Durham
Dean of Graduate College

This study is dedicated

to my parents

Clyde and Helen Jacob

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INTRODUCTION

The study of student learning styles is emerging as a promising area of teaching and learning research (Cornett, 1983). This is based on the idea that students vary in their approach to learning; consequently, no single instructional process provides optimal learning for all students (Dunn & Dunn, 1978).

Learning style is used by educators as a generic term or umbrella concept for recognizing individual learning differences. Learning style, as used in this study, refers to the individual's preferred ways of perceiving and processing information (Kolb, 1984). Preferences do not imply that these are the only ways the individual learns a given subject matter. They are, however, the styles with which the individual has the greatest experience and, therefore, represent the individual's learning strengths. An individual's learning style is, in fact, not one approach to learning but many (Briggs, 1980).

Studies in learning styles initially evolved as a result of interest in individual differences. Learning styles were investigated during the '60s and '70s; however, since that time, society and psychology have changed focus and, as a result, the current research concentrates more on group differences such as racial and sexual differences (Curry, 1983). The research in learning styles was

conducted prior to interest being generated in society or the field of psychology. The focus during that time was on the characteristics of the individual which might be hindering the learning process rather than on the methods and processes used by the individual to gain knowledge and information. When performance failed to measure up to potential, educators tended to attribute this failure to an emotional block, personality conflict or social class. Those early studies which did not address individual learning styles and methods of instruction tailored to meet those needs, left the field fragmented and incomplete (Curry, 1983).

During the past several years, research into learning styles has been renewed (Keefe, 1980). Knowledge or incorporation of a variety of learning modalities within the curriculum by teachers provides a means of potentially reaching every learner and for making the learning process more effective and efficient. Therefore, teachers who develop curricula, a variety of learning materials, and provide unique learning opportunities which engage the senses (auditory, visual, tactile, kinesthetic) are more likely to help all students maximize their learning potential. Many researchers recognize that people learn in different ways (McCarthy, 1981), and that one's way of learning is his or her learning style. According to Briggs (1980), people utilize many different approaches as they assimilate information. However, according to Dunn and Dunn (1978) under stress, the dominant learning style emerges. There are two

major differences in how one learns; the first is how one perceives experiences and information, and the second is how one processes and utilizes information.

Most importantly, as educators begin to understand learning style differences, they must also begin to acknowledge that people are different and these differences inevitably affect the way people learn. Teachers who recognize that their students perceive things in different ways are more flexible in their teaching styles (McCarthy, 1981). In new situations, some students sense and feel their way, while others think things through. These represent learning style differences (Dunn and Dunn, 1978; McCarthy, 1981).

For example, McCarthy (1981) notes that students who sense and feel relate to actual experience and become immersed in the concrete reality. They are intuitive because they perceive through their senses. Schools do not value the sensing/feeling approach to learning, therefore it is neglected, and sometimes discouraged. Conversely, those who think through the experience tend to become more involved with the abstract dimensions of reality. These people tend to analyze and critique their experiences, therefore, allowing their intellect to make the first appraisal rather than their senses and feelings.

As learning begins to occur, one must first process the experiences and information and then incorporate these cognitively as knowledge and understanding. After perception, processing take place. Some learners immediately process information, while others observe and reflect on what was

heard or experienced, with processing occurring later. Not everyone who works fast is impulsive. Some people are simply very bright and quick to understand. These individuals are called "fast-accurate" in the jargon of psychology (Woolfolk, 1987). The truly impulsive individual is one who responds very quickly but also makes quite a few errors in the process. A truly reflective person is one who is slow and careful to respond, but who also tends to answer correctly.

Kolb (1985) states that in processing experience and information, some people are watchers, while others are doers. However, Kolb states both ways of processing information and experience are equally valuable. Schools ask children to watch, listen and reflect. Obviously for a watcher this is ideal, but for a doer this is quite difficult.

Again, teachers who are aware of these different types of learners incorporate different approaches and modalities into their teaching methods (Myers, 1980). Myers argues that the predictable difference is that teachers using knowledge about the types of learners to assist with and enhance instruction have reported that students seem to learn in ways consistent with their types.

The Myers-Briggs Type Indicator, (MBTI), (Myers & McCaulley, 1985), a personality instrument used in this study, contains four separate indices which reflect one of four basic preferences and provides a means of assessing learning style differences. According to Jung's theory, these preferences direct the use of

perception and judgement (Jung, 1921). The preferences affect not only what people attend to in any given situation, but also how they reach conclusions about their perceptions.

Extroversion-Introversion Index: The Extroversion-Introversion (EI) Index is designed to reflect whether a person is an extrovert or an introvert in the sense intended by Jung (1921). Extroverts are oriented primarily toward the outer world; thus, they tend to focus their perception and judgement on people and objects. Introverts are oriented primarily toward the inner world; thus, they tend to focus their perception and judgement upon concepts and ideas.

Sensing-Intuition Index: The Sensing-Intuition (SN) index is designed to reflect a person's preferences between two opposite ways of perceiving: one may rely primarily upon the process of sensing, which reports observable facts through one or more of the five senses; or one may rely more upon the less obvious process of intuition (N), which reports meanings, relationships and/or possibilities that have been worked out beyond the reach of the conscious mind (McCaulley & Natter, 1981).

Thinking-Feeling Index: The Thinking-Feeling (TF) index is the third index which is designed to reflect a person's preference in arriving at conclusions. A person may rely primarily on thinking (T) to decide impersonally on the basis of logical consequences, or a person may rely primarily on feelings (F) to determine the basis of personal or social values.

Judgement-Perception Index: The fourth index is Judgement-Perception (JP) which is designed to describe the process a person uses primarily in dealing with the outer world. A person who prefers judgement (J) reports a preference for using a judgement process either thinking or feeling for dealing with the outer world. A person who prefers perception (P) reports a preference for using an observant or discerning process (either S or N) for dealing with the outer world.

Type differences have been found in creativity and intelligence among persisters (Anastasi, 1965), in advanced placement programs in high school (Helton 1964; Morris, 1968), and during student-teacher interactions in a college skills course which included reading (Schmidt & Fretz, 1965). Myers (1980) states that sensing children have less use for school than intuitive children. On the average, sensing children make lower grades and score lower on intelligence tests. Sensing children are also more likely to drop out of school than intuitive children.

Myers presented the table of percentages, replicated on page seven in this document, to show the relative frequency of sensing and intuitive types at different levels of scholastic achievement.

Table 1

Scholastic Achievement of Sensing/Intuitive People

No. of Students	Division	Sensing	Intuitive
671	Finalists for National Merit Scholarships	17.0%	83.0%
3675	Freshmen at Ivy League Colleges	41.0%	59.0%
1430	Adults Who Did Not Finish 8th Grade	99.6%	0.4%

One might conclude from the above table that students whose primary mode of learning is intuitive are more likely to be high achievers than their sensing counterparts. If these differences in sensing and intuition exist between black and white college freshmen, or males and females, results of this nature might provide some insights about achievement differences among these groups.

Further, these data indicate that sensing students are more at risk for dropping out of school. Because words, the necessary medium of education, must be translated from symbols into meaning by the listener, sensing types are less likely to succeed if the learning environment does not provide a more "hands-on" experiences for them. Intuitive types who are more adept at abstraction, verbal tasks, and symbolic reasoning are much more skilled in using language to learn and process information than sensing types, who are better able to process information by touch, smell, taste and hearing. When sensing

types have to use their intuitive perception, which is less developed than their sensing perception, they use more time and effort to make meaning out of abstractions such as words (Myers, 1980).

Cultural Differences In Learning Styles: Several researchers have noted that some children from culturally different backgrounds demonstrate high abilities in ways that are markedly different from children in the majority culture (Baldwin, 1968; Kitano and Kirby, 1985). Perhaps the most persuasive evidence about the learning styles of the culturally different is in Hale's (1986) Black Children in which she investigated black children, their roots, culture, and learning styles. Hale contends that the documented achievement gap between black and white students is directly correlated with functional illiteracy, unemployment, drug abuse, poverty and incarceration. These factors in combination with a distinctive African-American culture contribute significantly to black children's performance in school. Hale says in essence that one explanation for the difficulties black children experience in school may be their participation in a culture that is very different from the culture which designed the school.

Many studies have found black children to be more feeling oriented and people oriented and more proficient in non-verbal communication than white children. Similar results have been found with adults. For instance, Fleming (1984) studied 2,500 blacks and 500 white freshmen and seniors at 15 colleges,

including Spellman College in Atlanta, Ohio State University, and the University of Houston. Her study was conducted over a seven year period. She found that although black colleges had very limited resources and many operated under severe financial difficulty, students at black colleges became more assertive and enhanced their intellectual development and cognitive growth more than their peers at integrated schools. Therefore, these research findings seem to suggest that there might be more sensitivity to learning style differences of black students at predominately black universities since their achievement was higher than their black counterparts at predominately white institutions. If professors at predominantly white institutions were trained to be more aware of these issues then black students would be able to translate the familiar to the unfamiliar and the communication barriers would begin to be dissolved, thus making way for the learning process to begin (Williams, 1974).

Individual Differences in Learning Styles: The study of individual differences in the United States was pioneered by Cattell (1932) who noted that the prediction of achievement could be increased significantly by adding personality information to IQ scores. Recent research such as that reported by Dunn and Dunn (1978), and Hunt and Fizoll (1984) supports the contention that other factors such as matching students' and teachers' learning styles can also dramatically improve achievement and might be better predictors of academic success. Based on these considerations, one could assume that improvements in

achievement could be realized for a significant percent of all students, if needs were met based on learning styles.

In summary, the research presented seems to indicate that a myriad of factors contribute to differences in learning and processing information. These factors include individual differences, cultural differences, personality differences and learning style differences. Although literature was presented in this chapter which focused on cultural, individual and personality differences in learning, the intent of this study was to focus on learning style differences between blacks and whites and males and females. However, an understanding of these other areas provides a context or framework within which group differences between blacks and whites and males and females can be better examined.

Since there continues to be an achievement gap between black and white students, on-going research is still needed to better isolate the factors contributing to these differences. To date, most of the work in this area has failed to systematically investigate the factors which contribute to these differences especially between black and white young adults. Greater awareness and improved educational methods are needed among all educators in higher education if the high attrition rates of blacks in universities are to be reduced.

Statement of Problem

For many years black freshmen have failed academically in large numbers at colleges and universities around the country. Using high school grades, ACT

scores, PSAT scores, and teacher as well as personal references as support data, students are accepted to the universities with expectations of success. However, if black students are failing at greater rates than their white counterparts who have similar test scores on exams such as the ACT, then it seems plausible that other factors must be contributing to these differential rates of failure.

While many factors may contribute to black students' failure in universities, the purpose of this study was to determine if the learning style differences between black and white college freshmen might be a contributing factor. More specifically, this study examined the relationship between learning style, race, gender, grades and size of high school for black and white college freshmen.

Significance Of Study

If the academic needs of all students in universities are to be adequately met, it is incumbent upon researchers to gain a better understanding of the factors that may contribute to the gaps in achievement between students of different races and cultures, in particular black and white students. As the minority populations in this country continue to grow at greater rates than the majority population, how well society educates these groups will have an impact on the quality of life for all. A failure to improve the educational levels of blacks and other minority groups limits the availability of well trained and skilled people that will be needed for an information processing society. To this extent,

population specific strategies, aimed at enhanced academic success, can be developed which more closely match the learning styles of individual students as well as groups of students, thus helping to ensure more skilled and educated people in the workplace and in the society in general.

Definition Of Terms

For the purpose of this investigation the following terms and definitions will be used:

Learning Styles: Processes and modalities used by individuals to perceive and process information; may be aural, visual or kinesthetic.

Perceptual Modality: Means by which information is extracted from the environment via the senses. Acceptable modes for this study are:

1. Sensing: Means by which individuals become aware of things directly through the five senses.

2. Visual: Acquisition of information primarily through the observation of pictures, images, objects and activities.

3. Kinesthetic: Acquisition of information primarily through performance or engaging in body movements.

4. Auditory: Acquisition of information gained through listening.

5. Tactile: Acquisition of information gained primarily through touching and/or holding and is often demonstrated by a heightened sensitivity to people and feelings.

Intuitive: Process by which information or knowledge is gained or perceived without the benefit of logical processes, e.g., "masculine hunch" or "women's intuition".

Converger: Individual who acquires information primarily through logical analysis of ideas.

Diverger: Individual who acquires information from concrete experiences.

Preference Types: Styles most often used by individuals as they perceive and process information and make judgments.

Below is a list of specific types used for this study:

Introversion: Act of retreating into one's own thoughts and sensations through self examination.

Extraversion: Interest focused outside the self; directing of thoughts and concerns to external things.

Perceiving: Process by which one becomes aware of things, people, occurrences, and ideas.

Judging: Process of arriving at conclusions about perceptions.

Thinking: Process of making decisions by examining data, remaining impersonal and unemotional.

Feeling: Process of making decisions by attending to personal values and impression.

Statement of Hypotheses

In order to determine if significant differences existed in: (a) the learning styles of black and white college freshmen; (b) male and female college freshmen; (c) high, medium, and low achieving college freshmen; and (d) college freshmen who graduated from small, average, or large high schools, the following hypotheses were tested:

Ho^1: There are no significant differences between the learning styles of black and white college freshmen as measured by Myers-Briggs Type Indicator (Myers, 1980), and Learning Style Inventory (Kolb, 1985).

Ho^2: There are no significant differences between learning styles of male and female college freshmen as measured by the Myers-Briggs Type Indicator and the Learning Style Inventory.

Ho^3: There are no significant differences between the learning styles of black males and white males as measured by the Myers-Briggs Type Indicator and the Learning Style Inventory.

Ho^4: There are no significant differences between the learning styles of white females and black females as measured by the Myers-Briggs Type Indicator and the Learning Style Inventory.

Ho^5: There are no significant differences between the learning styles of students in small, 0-100; medium, 101-500; and large, 501-1000 high schools.

Ho^6: There are no significant differences between the learning styles of students with high (3.0-4.0), medium (1.1-2.9), or low (.00-1.0) grade point average.

Assumptions of the Study

The basic assumptions of this study include the following:

1. Responses to the MBTI and the LSI reflect each individual's subjective opinion of his/her own perceptual modality or learning style;

2. Learning style is related to academic success and to the learning process; and

3. Each participant is an enrolled college freshmen in good standing with the institution.

Limitations of the Study

The following limitations apply to this study:

1. The population to be sampled was restricted to students presently enrolled in five four-year public institutions of higher education located in the

South Central United States; all accredited by North Central Association of colleges and schools;

2. The study population was limited to 100 black students and 98 white students; and

3. The MBTI is a personality indicator which determines an individual's interests, values and skills based on responses to survey questions. The one classification on this instrument which denotes a learning style is the sensing/intuitive dimension, however, the personality dimensions according to Myers, (1971) also contribute to learning style preferences.

Organization of the Study

Chapter I has identified the problem under investigation determining if learning style differences exist between black and white college freshmen. This study was deemed important because of the need to reduce the high rates of failure and attrition among black college freshmen. It was determined that this study would fill an existing gap in information regarding learning style differences between black and white college freshmen.

Hypotheses, assumptions and limitations were delineated. Terms were defined within the context of the study. The Myers-Briggs Type Indicator and the Learning Styles Inventory by David Kolb (1985) were identified as the instruments selected to measure subjects' learning styles.

Chapter II consists of a review of related literature on learning styles which supports the need for this study. This chapter also presents a discussion of relevant learning theories and provides a conceptual framework for the current study.

Chapter III presents the methods and population under investigation and procedures used in this study. The instruments selected for this study are discussed, as well as the research design and plan for data analysis.

Chapter IV provides a description of the data retrieved. In addition, the results of the statistical analysis of each hypothesis are presented.

Chapter V provides a summary of the study with a discussion of the findings within the context of the theoretical framework. Specific conclusions are delineated with implications and recommendations for educational practices and future research.

CHAPTER II

REVIEW OF LITERATURE

This chapter presents a review of relevant literature which supports the need to examine possible differences in learning styles between black and white college freshmen. This review of literature is divided into seven sections: (a) definition of learning styles; (b) history of research on learning styles; (c) learning styles of blacks; (d) learning style differences related to gender; (e) learning style differences related to grade point average and size of high school; (f) relationship between learning styles and achievement; and (g) summary.

Definitions of Learning Style

While many definitions of learning styles exist, this section explores some of the more general explanations and culminates with the definition of learning style used in this study. Many approaches have been used to define individual learning differences; nevertheless, no single theory has found widespread acceptance (Danielson & Seiler, 1976). Two concepts, however, have been developed to foster an understanding of how people process information: cognitive style and learning style. Experts generally agree that every person has a unique approach to learning, although the experts do not agree on how to define or explain these learning approaches or styles. The concept of "learning

style" appears more recently in the research than the concept of "cognitive style," but includes many of the concepts from the earlier research on cognitive styles. For instance, learning style is similar to cognitive style in most aspects, but the context is more specific (Korhonen & McCall, 1986). Some learning style elements appear to remain stable in individuals, such as time of day preferences, while other elements seem to vary as children grow older (Price, 1980). As Claxton and Ralston (1978) have indicated, learning style is the student's preferred way of responding and using stimuli in the context of learning. Cognitive style, as defined by Klausmeier (1985), is a preferred way of reacting to environmental stimuli and may be viewed as a sub-category of learning styles.

Klausmeier (1985) defines an ability as one's capability to perform tasks. A style, on the other hand, refers to the learner's preferred mode and desired conditions for learning, such as a preference for acquiring information visually rather than aurally and requiring music rather than absolute quiet to study. Cognitive style, however, refers to how one perceives or comes to an understanding of a situation.

The growing body of literature concerned with individual styles or preferences for learning strategies reflects an approach to and definition of learning styles which can be utilized in classroom planning and application (Dunn & Dunn, 1978; Renzulli & Smith, 1978). Increased national interest in learning style differences has generated changes in the methods of identification, planning

of curricula and instruction, as well as in the definition of learning style.

Often learning style is used as a generic term by educators, a name for recognizing individual learning differences. There are also many specific definitions. For instance, Gregorc (1979) defined learning style as "a particular set of behaviors and attitudes related to the . . . learning context" (p. 2). Kolb (1981) suggests that learning styles develop as a consequence of hereditary factors, previous experiences, and the demands of the present environment. According to DeCecco (1968), learning styles are "personal ways in which individuals process information in the course of learning new concepts and principles" (p. 75).

Some experts emphasize the cognitive aspect (Kirby, 1985; Kolb, 1984), others concentrate on the affective aspect (Messick, 1969; McCarthy, 1981), and still others highlight the environmental aspects of learning styles (Price, 1980; Dunn, 1974; French, 1975). Griggs (1984) states that learning style models are based on the assumption that individual differences exist and that individuals have learning patterns that are unique which need to be accommodated. Smith and Renzulli (1982) say that learning style is not a matter of finding good or bad, or determining pass or fail, rather, it is a matter of discovering individual differences.

Perhaps the most thorough investigations of learning styles are those involving perception: the process most intimately associated with learning.

Educators usually refer to the channels through which perception occurs as modalities: the auditory (hearing), visual (seeing), kinesthetic (body movement from muscles), olfactory (smell), gustatory (taste) and tactile (touch). The channels most efficient for each person to process information are referred to as modality strengths (Barbe & Swassing, 1979).

Barbe & Swassing (1979) wrote about modalities as any of the sensory channels through which an individual receives and retains information. A critical component of their definition is the phrase, "receives and retains," since it implies that sensation, perception, and memory constitute what is called modality. The basis for describing modality as a preference is the view that individuals can give a definite answer when asked how they learn best - by seeing, hearing or doing. (Barbe & Swassing, 1979).

In looking at modalities further, Barbe and Milone (1980) felt that neither nature nor nurture fully account for the development of a modality strength. Most likely, a person's heredity, maturation, learning and cultural upbringing are all defined strengths that contribute to modality preferences. As children progress through elementary school, their modalities become mixed, interdependent and usually shift toward the visual and kinesthetic. By adulthood, most people have mixed modality strengths. Children with mixed modality strengths seem to have an advantage in the classroom (Dunn & Dunn, 1978). Indeed, they have a greater learning advantage than a student with a single

strength, because they are able to process information efficiently regardless of how it is presented. The other students learn much more easily when they are taught through their particular modality strength. Barbe & Swassing (1979) have stated that "the educationally relevant modalities which have the greatest utility in the classroom are the visual, auditory, and kinesthetic" p. 10.

Obviously, there are many definitions of learning style. Learning style, as the term is being used in this study, refers to the individual's preferred ways of grasping, transforming and assimilating information (Kolb, 1984). While preference for one style over another does not imply that an individual can only grasp information using a specific modality, preference does connote the styles with which the individual has the greatest experience. The individual's learning style becomes not one style but many (Dunn and Dunn, 1978).

History of Learning Styles

Research in the field of psychology has expanded knowledge in the areas of personal learning styles (LS) which tends to focus on the human organism's internal reactions to stimuli and the organism's external reactive behavior as a result of the stimuli. The research on LS comes directly out of the research in learning. It was not until the early twentieth century that learning was investigated systematically by Thorndike (1913). He conceived learners to be empty organisms who responded to stimuli more or less randomly and automatically at first. In his investigation, Thorndike explained learning as a

process of association and connection which contributed to the stimulus-responses (S-R) view of learning. According to Thorndike (1913), learners will acquire and remember those responses that lead to satisfying after effects (law of effect), and readiness of the organism (law of readiness). His laws of learning were major contributions to the psychology of learning at that time and greatly influenced learning theory.

The stimulus-response view of learning advocated by Thorndike was further refined by Skinner, as well as other researchers. According to Skinner (1968), behavior is learned and can be modified if certain environmental factors are shaped in a predetermined way. In his explanation, Skinner avoided the mental constructs, such as habit, need, motive, and cognition, and instead dealt with the overt measurable properties of behavior.

Although there are some differences in emphasis on learning theories among behaviorists, the common focal point is in the connection of stimuli and responses. Beginning with Thorndike's experiments, behaviorists have sought to discover general principles that explain learning. Through controlled experiments, they observed an organism's overt behavior and attempted to explain mental contingencies, rather than internal causes of action (Hill, 1964).

By the mid-twentieth century, Gestalt psychologists rivaled the behaviorists in influence on learning theory (Darkenwald & Merriam, 1982). In contrast to behaviorists, Gestaltists proposed looking at the whole rather than individual

parts, and at the total structure of learning rather than at isolated incidents. Therefore, they believed that simply studying a stimulus and a response did not allow one to achieve a full understanding of the incident. Perception of the environment is not an isolated experience, but occurs in relation to the total configuration of the environment. In Gestalt theory, insight and motivation are key elements in learning. Thus, the Gestaltists broadened the investigation of learning to include understanding, insight, and problem solving.

However, French (1981) and Cherry (1981), also contradict the stimulus-response approach in that they believe human learners are purposeful actors in the world of learning, not simply reacting to stimuli. Other authorities have addressed the issue of individual differences in the learning process. Educators in most fields recognize the need for diversity of instruction to coincide with individual differences in the learning process.

McKenny (1972) believed individuals develop both conscious strategies and unconscious habits for processing information. According to McKenny, communicating with the environment and organizing data provide the essential cognitive process.

Goldstein and Blackman (1978) among other theorists, offer an approach to human learning that has relevance for learner's perception. According to them, the major long-term objective of education is "the learner's acquisitions of clear, stable, and organized bodies of knowledge" (p. 33). Gagné (1977) also

makes the assumption that learning is not simply an event that happens naturally; it is an event that happens under certain observable conditions "and . . .implies that one can bring about learning by manipulating the environment" (p. 34).

Minimum consideration was given to differences among individual learners in early research and theory. Gagné (1977) seemed to view learning as a simple relationship between stimulus and response. He wrote, ". . . there is an unvarying relationship between stimulus and response" (p. 8). Gagné (1977) viewed all animals, including human beings, as near equals in the learning process. He explained it as follows:

> First there is a learner, who is a human being. (It would be possible for the learner to be an animal, but that is another story). For the events considered here the most important parts of the learner are his senses, his central nervous system, and his muscles. Events in his environment affect the learner's senses, and start chains of nervous impulses that are organized by his central nervous system, specifically his brain. This nervous activity occurs in certain sequences and patterns that alter the nature of the organizing process itself, and this effect is exhibited as learning. Finally the nervous activity is

translated into action that may be observed as the movement of muscles in executing responses of various sorts (p. 6).

Gagné's emphasis was on the underlying physiological changes in learning. Gagné (1967) clearly states that learning is an individual matter. In a 1970 Phi Delta Kappa article, he seriously questioned earlier learning theories. Gagné's article focused on the new views related to instruction. Gagné clearly stated the need to consider individual differences and to individualize the instructional processes.

As previously stated, Gagné views the most important parts of the learner to be his/her senses, central nervous system, and muscles. That is to say, when a learner is in a learning situation, physical stimulation of eyes, ears and other senses is transformed into certain neural "messages". The messages in turn undergo other transformations in the nervous system and are then stored and later recalled. The recalled information is again transformed into still other kinds of messages which control the action of the muscles. The result of speech or other types of movements indicates that a performance has been learned. These forms of transforming are called "learning processes" (Gagné, 1974, p. 15).

Others, such as Lowenfeld (1983), also consider the senses to be an important aspect of individual differences and learning. The study of the human senses, as related to learning, is most often associated with perceptual psychology. Forgus (1966) clearly accepts the theories of individual differences

and learning styles. He separates the human learner from lower animals, and identifies perception or extraction of information from the environment as the major difference between learners. According to Forgus (1966), perception, learning, and thinking have traditionally been referred to as cognitive processes, since they all, to some extent, are concerned with the problem of knowledge. Learning is defined as the process by which information is acquired through experience and becomes organized as a storage of facts. "Cognitive development" refers to the process by which a child becomes aware of, knows, or learns to identify, labels and interprets his world through a set of cognitive or mental processes (Williams, 1974). Cognitive theorists believe that learning is the result of individuals successfully making sense of the world (Woolfolk, 1987). Some examples of cognitive styles of perceiving and organizing information are: (a) Field-dependent vs. Field-independent. The basic difference between the field-independent and field-dependent style is in perceiving and ordering the stimulus world. Field-independent individuals interpret and restructure environmental situations and field-dependent persons also restructure environmental situations but then accept them as experienced. Consequently, field-dependent people are attentive to social cues while field-independent people are less attentive to social cues and prefer to work with ideas and abstractions; and are impulsive vs. reflective (responding quickly and/or accurately vs. responding slowly and accurately).

According to Woolfolk (1987), once teachers realize that individual students have different styles of organizing and receiving information, they should also begin to realize that different teaching methods may be more appropriate.

Vygotsky (1966) suggested that cognitive development depends on interaction with other people. He believed that cognitive development occurs through the interaction of the child with adults and more capable peers. He used the term "scaffolding" to describe assistance that is given to students in providing the information and support necessary for the child to grow intellectually. Recent data and their theoretical interpretation suggest that it is not so much when abilities are acquired but, rather, what is learned that determines the kinds of cognitive information an individual is capable of extracting (McCarthy, 1981).

Barbe & Swassing (1979) found that individuals have a modality through which they prefer to receive information. However, Wober (1980) who worked with the Embedded Figures Test, the Rod-and-Frame Test, the Kohn Block Design, and the Raven's Progressive Matrices found that these tests were biased toward individuals whose primary mode is visual. In addition to these visually oriented versions, the tests were converted into kinesthetic and tactile versions. The results demonstrated that the style of processing information in one modality does not correlate highly with the ability to process information in another modality. Individuals who had performed at the lower end of the continuum on

the visually oriented tasks, did better on the kinesthetic/tactile versions of the instruments. This supports the idea of individual preferences based on modality dominance. Barbe and Swassing (1979) promote the belief that, while all modalities are active, individuals find some modalities more effective and efficient than others for the acquisition of cognitive content.

Learning styles have been explored from many perspectives and although researchers do not agree on how to define or explain these various styles, there does seem to be general agreement that every individual has his or her own approach to learning. Increased awareness of this issue and practical application of this knowledge can offer greater opportunities for improving the quality of education for all students.

Learning Styles of Blacks

Identifying black and white differences in learning styles is a perilous task because in the past, identified variations were often interpreted as being deficient and negative. As this study explores the differences in learning styles of black and white students, it is assumed that any differences will be viewed as preferences of stylistic dimensions, rather than evidence of inferiority on the part of any group. Investigations of learning style preferences of the culturally different have revealed group differences on selected learning style elements. However, it is important to recognize that assessment should extend beyond

group differences, for within any special population there are broad differences, as well as similarities, in learning style preferences (Griggs, 1984).

Williams (1974) states that some interpretations of the cognitive development of the black child are based on myths. It has been assumed that the cognitive development and language acquisition processes of black children are deficient when compared to the process of white children (Williams, 1974). Williams and others say that this assertion is not true. Neither the cognitive processes nor the cognitive development of the black child is different from that of the white child, if we mean by cognitive development one's capacity to discriminate, recognize, identify, and manipulate the features and processes of the world around him (Williams, 1974).

Chunn (1974) notes that:

> No group of children can be said to have a cognitive deficiency in an absolute sense. The ability to perform cognitively may be more a function experience and the context of the situation in which a culturally diverse child is required to perform (p. 10).

Thus, the style of learning, not the ability to learn may be different; these differences can be called learning styles (Bland, Sabatino, Sedlak, and Steinberg, 1979). It has been suggested that learning styles of minorities may cause students to behave or respond in a manner that sets them apart from the

majority of students (Cohen, 1976). Also, Witkin & Berry (1975) state that cognitive styles are self consistent preferred modes of thinking and perceiving, although methods of processing information may vary among different racial or ethnic group (p. 47).

Cultural perceptions and values also tend to create differences in learning and behavior patterns that may initially be at odds with those expected in school (Cole & Scribner, 1974). Perception is the basic process of cognition as it is the process through which the living organism maintains contact with the environment (Travers, 1982). Researchers believe that the perceptual processes of blacks differ in style from other groups (Hale, 1986; Greenwood, 1982; Madler & Stein, 1977). These processes also have been described as learning styles (Ramirez & Costaneda, 1974). McCaulley and Natter (1981) suggest that children in all grades should be given maximum opportunity to learn the things that have meaning and interest for them in terms of their own kind of perception and their own judgments.

Williams (1974) proposes that the labeling processes of attaching language to cognitions is different in the black and white child because of culturally different environments or backgrounds. Black children are typically in a different labeling environment than white children, so that they may not label their cognitions in the same way as the mainstream child. This does not mean that

they are deficient in any skill because they use different labels, nor does it mean that they have inferior language abilities.

Morgan (1981) suggests that learning habits of black students have been referred to as "relational," in that they are more experienced with educational environments that employ social-centered learning material and techniques, cooperation among students, verbal tasks, learning by modeling and imitation, as well as global aspects of conceptual learning. Hale (1986) maintains that blacks are more involved in the affective dimensions of student behavior, while their white peers have been conditioned by parents and educators toward the cognitive functioning which schools value and stress. However, research indicates that variance in intellectual ability and academic performance tend to be more discernible along socioeconomic lines, rather than cultural or racial lines (Burns, 1979).

Marjoribanks (1972) found that such factors as: (a) achievement, (b) level of environmental interaction, (c) intellectual, and (d) standard language development are a common set of environmental factors that could be identified as accounting for a large percentage of the variance which contributes to the learning style differences among children from different cultural settings. Almanza and Mosley (1980) suggest the possibility that information about specific cultural groups could be taken into consideration by matching the learning style to the teaching style. In this case, they suggest that black children

have a richer movement repertoire than do white students. Thus, the curriculum probably needs to be in segments that allow tasks of short duration and do not require the child to remain stationary. The authors qualify this statement by indicating that being black does not necessarily mean a child will be more active, but that the possibility does exist and should be considered. It should also be noted that in terms of learning style, the authors conclude that students who need the greatest amount of task structure and teacher attention and who also demonstrate signs of distractibility and hyperactivity often tend to be minority children of low income parents (Almanza & Mosley, 1980).

According to Chalfant and Scheffeling (1969), several modality characteristics presume to show a relationship to the child's success or failure in performing various tasks. The tasks are analyzed in terms of the perceptual channels required in order to receive the presentation and perform the task. These channels are auditory, visual, kinesthetic or tactile in nature. Barsch (1971) states that one of the first variations noted in " A Black American" perceptual style is the preference of modalities for receiving information. He states that the information presented in the environment is registered in all six sensory channels, however, there appears to be a hierarchy of development which leads to a preference in the use of channels. It appears that for most blacks the preferred modality is sensory. McCarthy (1981) states that as learning

occurs and cognitive effectiveness increases, the kinesthetic, auditory and visual modes become the ones most heavily relied upon.

Keil (1966) notes that there are certain modes of perception more characteristic of the black community than the white community. Keil writes:

> . . . it's modes of perception and expression, it's channels of communication are predominantly auditory and tactile rather than visual and literate . . . the prominence of the aural perception, oral expression and kinesthetic codes . . . sharply demarcate the culture from the white world . . . (pp. 6-17).

Although the aural mode is an important channel in the black culture, the kinesthetic mode appears to be the primary mode of information for the majority of members in that community (Morgan, 1981). Morgan also states that, based on the literature in the field of motor learning, evidence supports the notion that blacks are high in motoric perception. Also in the research on learning styles, blacks seem to prefer affective materials to facilitate their learning (Rychlak, 1975), warm and supportive teachers, (St. John, 1971), and a socially interactive environment (Cureton, 1978; Slavin, 1983). As Morgan (1981) points out in his examination of the learning styles of black children, it appears that black children do well in an atmosphere that fosters social interaction.

However, in the United States, researchers find most individuals perceive information via the visual channel. For instance, Wober (1980) feels that the

majority of information in our society is transmitted through visually oriented material. As Wober examines the instruments on which many judgments about individuals are made, such as Raven's Progressive Matrices, the Bender-Gestalt Test, the Thematic Apperception Test, the Group Embedded Figures Test and the performance tasks of the intelligence tests, he notes that they are predominantly, and almost exclusively composed of visual information processing tasks. Williams (1974) contends that the real problem concerns the fact that despite the black child having a certain amount of information in his/her mental storage, no systematic scheme has been developed for relating that information, plugging into it, or engaging it. Williams and Rivers (1972) have shown quite clearly that the test instructions in standard English usually penalize the black student. For example, their research found that if a black child is asked to indicate by marking in a booklet where a toy is "behind a sofa," the child frequently misses the item for two reasons. First, the child codifies the cognition "behind" differently since the word "behind" can mean a variety of things to different people. Second, the child also codifies the term "sofa" differently in his mental storage. When the test item is changed from unfamiliar to familiar language, such as "mark the toy that is in back of the couch," children understand the language much better as they already have the information in their mental storage (Williams, 1974, p. 46). Researchers such as Hale (1986) and Williams (1974) contend that black students must possess a great deal of

learning style flexibility in order to survive in urban schools and society in general. They must be able to switch codes from "everyday talk" to "school talk". Everyday talk is a kind of familiar informal language where one is only concerned with phonology and syntax. This same code switching is found among most students who speak a dialect or another language. Hale (1986) states that concern about communicating school talk or Standard English is very formalized because emphasis is placed on grammar, diction, syntax, etc. Williams (1974) further states that when children are placed in a school system that employs a language code different than their own, either the school must switch to that child's learning style or the child must switch codes or styles. Usually the child is required to switch codes, suggesting cognitive flexibility rather than cognitive rigidity if, and only if, the child is consistently successful.

In summary, the literature tends to dismiss the fallacies and myths of cognitive development inferiority of black children. Rather, this section suggests that minority children's learning styles may cause students to behave or respond in a manner that sets them apart from majority students (Cohen, 1976). This section also addressed cultural perceptions and values which tend to create differences in behavior patterns that may be at odds with those expected in school (Cole & Scribner, 1974).

The research supports the notion that the perceptual processes of blacks differ in style from other groups. These processes are termed learning styles.

Other researchers propose that the labeling process used by children to attach language to cognition is different in black and white children. In searching the related literature, one might conclude that differences in learning styles of black and white students does exist, however, the published research has not investigated the correlation between these differences and academic achievement in college.

Learning Style Differences Related to Grade Point Average and Class Size

Educators need to know as much as possible about the academic strengths and weaknesses of the students with whom they interact. Most colleges and universities find it advantageous to place students in certain freshman courses in accordance with their ability and their previous preparation. For instance, college faculty and administrators are concerned about the level of academic ability for the freshman class. Academic potential in college is estimated from a variety of sources, such as a student's scores on the four ACT subtests (English, Mathematics, Social Studies and Natural Sciences) or from the average of four recent high school grades (High School Average - HSA): English, math, natural science, social studies reported, by the student at the time he/she was tested on the ACT Examination. HSA predicts college grades about as well as High School Rank (HSR). The ACT Predictive Research Service provides the number of students at different colleges and universities who obtained a particular

standard score on each ACT subtest. They also provide the percentile rank (PR) corresponding to each score.

Drawing upon test scores, high school grades, and other educational information collected routinely by ACT, the ACT Predictive Research Service provides a description of academic potentials and achievements of the current freshman class. Prediction equations have been utilized in forecasting the performance of these students. ACT test scores and high school grades have been established as good predictors of academic achievement. The higher the scores, the higher probability of eventual academic achievement in college, according to the American College Testing Program (1972). Since these two variables have been shown to be good predictors of academic success, perhaps by examining additional variables such as high school class size, rank in class and gender differences relative to achievement, a more composite set of criteria can be examined which may be even more predictive of college achievement, especially for black students. In addition, by examining the student's past learning experiences, as well as learning environment, more appropriate educational and instructional approaches can be developed.

Typically, women earn both higher high school grades and higher college grades than do men, although the sexes score about the same on ACT composite, (ACT, 1971, and Barker & Gumer, 1964). The American College

Testing Bureau states that college women average about .4 of a grade point higher on HSA than do enrolled college men.

In conclusion, ACT scores and high grades have been found to be very predictive of academic success in college. By continuing to examine other factors such as learning style and gender differences, just to name a few, more variables can begin to be isolated which contribute to high achievement. Greater predictability would also allow for early intervention for students needing assistance and thus, improve their chances for academic success.

Race and Gender Differences in Achievement

In an effort to find out what factors contribute to the differences in achievement among black freshmen in predominantly white schools. Fleming (1984) reports that black males attending predominantly black universities are more competitive and career minded than their black counterparts at white universities. Black males' specific complaint about teachers was that they did not grade fairly (Fleming, 1984). Black males at white universities show the strongest signs of academic demotivation. Fleming also reports that black women are able to gain more from the white college experience than black men.

Astin (1986) argues that the student's high school grades have proven to be the most important predictor of college grade point average (GPA). Prediction tends to be somewhat better for American Indians and whites (average r = .50) than for other minority groups (average r = .35).

Furthermore, the students' High School Grades or Rank in class were consistent and substantial predictors of college successes. For whites, high school grades are also positive predictors. For whites, high school grades also are positive predictors of undergraduate satisfaction. Astin (1986) reports that student's academic aptitude, as measured by standard admissions tests (Scholastic Aptitude Test and the American College Test), does not show a substantial relationship to many outcomes. As a matter of fact, test scores contribute to the prediction of college grades for only two groups (blacks and Chicanos) and the magnitude of the relationship is quite small in comparison to the relationship between high school grades and college grades.

In summary, test scores predict undergraduate persistence for only one group (blacks), and once again the relationship is weak in comparison to the relationship for high school grades (Astin, 1986). Given the fact that test scores are often not predictive of academic success for black students, this again offers support to the fact that other factors need to be examined which may be better predictors of achievement for this group.

Achievement

An intrinsic satisfaction of doing something better for the sake of doing, is an achievement motive (McClelland, 1985). For some years, studies have focused on the behavioral consequences of differences in achievement motive.

However, researchers have found that what constitutes the challenge to achieve for one individual poses the threat of failure for another.

Theoretically, students high in achievement motivation should prefer working in situations where they get feedback on how well they are doing (McClelland, 1985). Otherwise, they have no way of knowing whether they are doing better than others or not. McClelland says that people high in achievement motivation would prefer being personally responsible for a performance result, because only under such conditions do they feel satisfaction from doing something better. Contrary to this is the behavior of those low in achievement motivation who achieve various performance situations for a variety of incentives external to themselves, rather than because of being motivated intrinsically (McClelland, 1985). McClelland and Atkinson (1965) find that a person low in achievement motivation is high in anxiety, indicating fear of failure.

O'Conner, Atkinson and Horner (1966) examine the effects of achievement in ability grouping on performance in the classroom. They reason that in a normal classroom, where children of very different abilities are present, those with high ability perceive the probability of success to be high, whereas those of low ability perceive success to be low. In these classes, students with high achievement motivation, in comparing their performance with that of other students, would not be maximally challenged, since they would perceive themselves performing better than really poor students, although not performing

nearly as well as the best students. However, if they were grouped with students with similar learning styles in homogeneous classes, their performance improves significantly (McClelland, 1985). Heckausen (1967) observes children's success and failure in working at various tasks and concludes that achievement motivation first appears around the age of three to three-and-a-half, when the success or failure of one's activity directs the pleasure or disappointment not only at the outcome of the activity but rather at the self. Heckhausen concludes that with successes the child experiences pleasure about his/her competence, and with failure experiences shame about his/her incompetence. Thus, there appear to be individual differences with regards to achievement needs. Gougis (1986) addresses the difference between black and white Americans in academic achievement. His findings indicate that the statistical means for blacks as a group on various measures of academic achievement are significantly below the means for whites.

Coleman (1966) released, through the U.S. government, a report which provides a detailed comparison of racial groups on achievement tests in various subjects. This report states that on approximately normal score distributions, only about 16% of the blacks scored above the white means.

Data collected in 1971 and 1975 indicates the same pattern (Galladay & Noell, 1980). In 1983, the College Board reported that blacks scored below whites on every achievement test, including mathematics, literature, science, and

foreign language. Gougis (1986) states, however, that there also is a social effect: in both races, high-income students do better on the aptitude tests than low-income students. Although the black-white difference is smaller at higher income levels, there still remains a substantial difference at all economic levels.

Gougis (1986) states that race prejudice is an environmental stressor that increases emotional trauma of blacks over and above that experienced by other groups in the United States. This stress, he states; is likely to affect students' daily academic performance adversely by reducing their willingness to persist at academic tasks and with cognitive processes involved in learning. Regardless of its causes, emotional stress can have adverse effects on academic performance. Stress can reduce any student's motivation to learn and can interfere with memory and other cognitive processes (Gougis, 1986).

Gougis states:

> The cultural learning style of many blacks, although having adaptive significance within the black community, may pose a handicap in an academic environment that is based on the learning styles of the white middle class. Race prejudice in the form of ethnocentrism may act to institutionalize cultural bias. Prejudiced teachers can effect students in a more personal way: low expectations, hostility, and differential treatment can adversely affect blacks in the classroom (p. 15).

One may conclude that the achievement motive is strongly or weakly established in a person's learning pattern and experiences either reinforce or extinguish this achievement motive. This section also addressed the differences between black and white students in academic achievement where those findings have a bearing on the current investigation.

Gender Differences in Learning Styles

Learning style researchers have noted the possibility that there may be gender differences in learning. The most salient and irreducible human differences are those which separate male from female. There are many differences between males and females. However, many culturally supported stereotypes of masculinity and femininity are without a genetic basis. For instance, Block (1973) in his study of the United States and Western Europe, found that parents, especially fathers, emphasized different values in rearing their sons and daughters. For their sons, assertion, achievement, and self-aggrandizement were encouraged, while their daughters were taught to control aggression, assertion, and self extension. For girls, the emphasis in the parent-child relationship is on communication, protection, and support. Sex-typing in the United States is found to be more intense than in Europe. These differences should not be seen as innate. Researchers such as Westmann (1973), hold that there are no absolute or inherent masculine or feminine behavioral characteristics and that males and females can be equally socialized to become

aggressive, dependent or passive, etc. Money (1961), and Mischel (1966) argue that the human infant is more malleable and more susceptible to learning than heretofore believed.

D'Andrade (1966) has written a comprehensive review of data pertaining to sex differences. She found nearly universal gender differences in behavioral, social, emotional, and cognitive variables, each of which derives from differences in primary and secondary physical sex characteristics found in every society studied.

Whiting (1970) cites findings from his cross-cultural study of child rearing practices and personality development. He found that boys across six diverse cultures were more aggressive and wandered farther from home more than girls. Moreover, the differences were greater at an earlier age than later. His findings seem to suggest that the differences in aggression are biologically determined.

A major factor in determining whether a given study finds sex differences, as stated by Westman (1973), is the nature of the items included on the test. Some tests, such as the Standford Binet, have been standardized in such a way as to minimize sex differences; other tests, such as the Thurstone Primary Mental Abilities Test, have not been standardized. Maccoby and Jacklin (1974), state that since boys are better at some kinds of tasks and girls at others, the sexes can be made to differ in either direction, or to be the same, depending on the mix of items included on a test.

The more accelerated maturation of the female child is confirmed by the findings of Singer, Westphal & Niswander (1968). Accordingly, Singer and her associates recommend that performance tests be standardized by gender, rather than by chronological age alone in order to control for maturational differences between boys and girls at a given age.

Maccoby and Jacklin (1974) allege that the sexes differ in their perceptions. For example, hunger seems to be triggered by visual stimuli for boys and auditory stimuli for girls. From their studies one may conclude that boys tend to show greater interest in objects and visual patterns, while girls are congenitally more interested in people and facial features. This statement implies that from birth boys show more interest in objects and visual patterns, whereas girls show more interest in social stimuli of all kinds. If the two sexes did begin life with different perceptual biases, this might have far-reaching effects upon their development, and would help to explain certain differences in aptitudes or interests of learning patterns that can be detected at a later point. Garai and Scheinfeld (1968) suggest that a difference in sense modality between the sexes, . . . if corroborated . . . would provide an explanation for the apparent tendency of girls to develop superior verbal skills, as well as for that of boys to excel in spatial perception.

Maccoby (1974) states that it is not known whether the relevant portions of the nervous system develop at different rates in the two sexes. Maccoby and

Jacklin (1974) state that the auditory system develops somewhat faster in girls, but that boys will show as much responsiveness to sounds, as soon as their neural growth has caught up. Sherman (1971) suggests that a modality preference is established early and maintained. Subsequently, boys come to rely on vision during the time when audition is not fully functional, and continue to rely upon it even after the time when they would be physiologically able to make greater use of audition.

There is good reason to expect sex differences in the chemical senses. Moreover, changes in estrogen levels during the normal fluctuations of these hormones in women are associated with changes in acquiring the sense of smell. With increased estrogens after puberty (Money & Ehrhardt, 1972) and during the menstrual cycle (Schneider & Wolf, 1955), women become considerably more sensitive to odors.

In conclusion, it is noted that the majority of studies of general ability with subjects over the age of six seem to have used well-balanced tests and found no sex differences. Thus, the literature does not reveal gender differences as they relate to learning style per se.

The overwhelming majority of reports of cognitive sex-related differences refer to differences in test scores. Some researchers argue that if one's goal is to maximize individual differences, then it makes no difference if the individual

differences are maximized surrounding the sex variable or about some other variable.

Summary

This chapter presented literature examining the concept of learning styles as they relate to black students in comparison to the white majority student population. There were also some considerations of specific ethnic and racial learning styles, and the possibility of matching learning styles to instructional procedures was mentioned as a possible outcome of research in this area. The limited research in this area to date leaves it unsupported as an effective teaching approach.

Many definitions of learning styles were given, although no one theory has acceptance among all audiences or researchers. Learning styles have been examined from a cognitive perspective, individual learning differences perspective, stimulus-response perspective, as well as from a perceptual modality perspective. The studies examining learning styles from a perceptual perspective have been the most thoroughly investigated. These studies have examined the role of sensory modalities in processing information. The modalities include auditory, visual, kinesthetic, olfactory, gustatory and tactile. It appears from the literature that a combination of heredity, maturation, learning and cultural upbringing all contribute to the modality strength often preferred in processing information. Preference is not a rigid or static concept in that a preference only

denotes the style with which the individual has the greatest experience. However, learning styles encompass many approaches as individuals gain and process information in their environments.

Also addressed in this chapter were gender differences, GPA, and high school class rank as predictors of academic success. The research also addressed achievement in terms of internal and external motivation. Achievement differences between blacks and whites was examined from a socio-cultural perspective, as well as from a learning style preference perspective. Researchers also addressed the issue of prejudice and its effects upon academic achievement in the life of black students. It was determined that prejudices can adversely affect learning, its style and the total impact on the black child. Ultimately, there are many variables to be considered in investigating the learning style differences of black students at all educational levels, preschool through college.

CHAPTER III

METHODOLOGY

The methods and procedures employed for this study are presented in this chapter. The chapter is divided into the following areas: (a) subjects, (b) instruments, (c) design, (d) procedures, and (e) summary.

Subjects

The participants in this study were 100 black freshmen students and 98 white freshmen students enrolled at four state supported universities in the south central United States. All participants were freshmen who were enrolled in English Composition I classes. The ages ranged from 18 to 22 years ($x = 20$ years). The sample consisted of 48 white females, 50 white males, 50 black males and 50 black females. Twenty-two black males had incomplete data on the LSI. Two white females failed to include ACT scores and one white female did not include her GPA. The white females who did not include ACT scores were totally eliminated from the study since the data was convaried by ACT scores. The female who did not include her GPA remained in the study. Thus, out of an original sample of 50, only 48 white females were included in the final sample. A list wise deletion was done to compensate for this loss of data. Consequently, all subjects were not included in all analyses.

English Composition instructors were approached and asked if their students could be surveyed. Demographic data were collected on each subject (See Appendix A) which included grade point average, ACT scores, age, sex, race, and size of high school. (See Table 2 on page 52 for means and standard deviations on ACT and GPA by Race and Grade). Students participated on a voluntary basis.

Instruments

Overview of the Myers-Briggs Type Indicator

The learning styles of the student participants were determined by their scores on the Myers-Briggs Type Indicator (1962). Examples of MBTI items are as follows:

1. When you go somewhere for the day, would you rather:
   (a) plan what you will do and when or
   (b) just go?
2. Does following a schedule:
   (a) appeal to you or
   (b) cramp you?

The responses are aimed at determining how a person usually feels or acts. Students are instructed to select a response that best suits them. There are no "right" or "wrong" answers to these questions. The student's should reflect his/her feelings and choices. This instrument was selected for its substantive

Table 2

Means and Standard Deviations on ACT and GPA by Race and Gender

Groups	ACT* N	ACT* M	ACT* SD	GPA** N	GPA** M	GPA** SD
White						
Male	50	14.18	3.65	50	2.77	.74
Female	48	16.02	4.13	48	3.07	.60
Black						
Male	50	14.28	3.06	50	2.81	.64
Female	50	14.34	3.05	50	2.77	.63
Total Blacks	100	14.31	3.04	100	2.79	.63
Total Whites	98	15.08	3.98	98	2.92	.68
Total Males	100	14.23	3.35	100	2.79	.69
Total Females	98	15.16	3.70	98	2.92	.63
Total Sample	198	14.69	3.55	198	2.85	.66

*ACT = American College Test
**GPA = Grade Point Average
N = Number of Subjects in Each Group
M = Mean
SD = Standard Deviation

theoretical and empirical base (as related to learning style preferences), its availability, ease of administration, scoring, and its structure, which allows free understanding of both similarities and differences among human beings. A dominant learning style was determined for the theory of psychological types described by C. Jung (1921).

The MBTI grew out of Jung's theory, as interpreted primarily by Isabel Myers-Briggs. The purpose of the Myers-Briggs Type Indicator (MBTI) is to make the theory of psychological types, as described by Jung understandable and useful in people's lives. Jung's theory helps to provide a theoretical framework to scientifically and systematically investigate learning style differences. Later, using Jung's theory to develop a conceptual framework, Myers (1971), Lawrence (1982), and McCaulley and Natter (1981) developed the MBTI as a practical way to gain insights about individual differences.

The MBTI is based on Jung's ideas regarding perception and judgment, and the attitudes in which they are used differentially in people. The essence of Jung's theory is that much of what appears to be random variation in human behavior is, in fact, orderly and consistent, as a result of basic differences in the way individuals choose to use both their perception and judgment. In brief, if people differ systematically in what they perceive and in how they reach conclusion then it seems logical for them to also differ in their values, interests, skills, motivation and reactions.

Four MBTI Preferences

The MBTI has four separate indices, each of which reflects one of four basic preferences. According to Jung's theory (1921), these preferences direct the use of perception and judgment.

Preference: Sensing-Institution/Perceiving

According to Jung (1921), humans have two very distinct ways of perceiving. One means is sensing, which is a process by which we become aware of things through our five senses. The other process is intuition, which is the indirect perception or act of knowing, without the direct benefit of rational processes, e.g., woman's intuition. Further, he contends that early in the developmental process, children exhibit a preference between the two ways of perceiving. Whichever is preferred becomes the dominant mode of extrapolating information from the environment.

Thus, as children become adults, they develop along divergent lines. Each generally becomes adultlike in their preferred mode, while remaining childlike in the other area. Both direct their energy and channel their interests into activities that give them a chance to use their mind as they prefer. This is known as the SN preference: S for sensing and N for intuition. The Sensing and Intuition dimension has been shown to directly affect learning style (Willis, 1984).

Preference: Thinking-Feeling/Judgment

Myers (1980) notes that a basic difference in judgment occurs because of the two distinct ways of arriving at conclusions. One way is by thinking, which is a logical process, and the other is by feeling, "that is by appreciation-equally reasonable in its fashion - bestowing on things a personal, subjective value" (p. 3). Consequently, just as perceiving develops along divergent lines, so does judging. The child who prefers feelings becomes more skilled in human relationships, whereas the child who prefers thinking becomes more adapt at organizing facts and ideas. This is known as the TF preference: T for thinking and F for feeling.

Combinations of Perception and Judgment

The TF preference (thinking and feeling) is independent of the SN preference (sensing or intuition). Either kind of judgment can be paired with either kind of perception, yielding the following combinations:

1. ST - Sensing plus Thinking
2. SF - Sensing plus Feeling
3. NF - Intuition plus Feeling
4. NT - Intuition plus Thinking

These combinations produce different personality types as characterized by values, interests, needs, etc.

Preference: Extraversion/Introversion

Another difference in people's use of perception and judgment focuses on individuals' interests in their inner (world of ideas) and outer world. This index is known as the Extraversion-Introversion Index and is designed to reflect whether a person is an extravert or introvert, as determined by Jung (1921). The introvert's main foci are in the world of concepts and ideas, while the extravert (E) focuses more on the outside environment. It is important to note that individuals are not limited to either the inner or outer world. Each type can ably access the other dimension, however, their natural preference remains with where their earlier interests were developed.

Preference: Judgment/Perception

The fourth preference is the Judgment/Perception index (JP) which is designed to describe the process a person uses as they deal with the outer world. A person who prefers judgment (J) indicates a preference for using a thinking or feeling process with the outer world. On the other hand, a person who indicates a preference for perception (P) has reported a preference for using a sensing or intuitive process in interacting with the outer world. Individuals who prefer judging tend to live in a planned and orderly fashion aimed at regulating and controlling events in their lives. Those persons who prefer to perceive tend to live in a more flexible or spontaneous way aimed to understand and adjust to events.

Sixteen Preference Types

According to Jung's theory (1921), one pole of each of the four preferences is preferred over the other poles. The preference on each index is independent of preferences for the other three indices. The four indices then result in sixteen possible combinations called "types", denoted by the four letters of the preferences (e.g., ISTP, ENFP). The theory postulates dynamic relationships among the preferences. Each type has its own pattern of dominant and auxiliary processes and the attitudes (E or I) in which these are continuously used. The characteristics for each type follow from the dynamic interplay of these processes and attitudes. (See Appendix B for characteristics frequently associated with each of the 16 types.)

In conclusion, the main objective of the MBTI is to identify four basic preferences. The indices EI, SN, TF, and JP are only designed to point in one direction or the other. They are not designed as scales for measurement of traits or behaviors. The intent is to reflect a consistent choice between polar opposite ways of responding and interacting in the environment.

Items and Scores

The MBTI items scored for each index provide forced choices between the poles of the preference under consideration. The choices reflect the two

poles of the same Jungian preference (e.g., S or N or E or I; never E or N or N or F). Every response to a question receives a weight of 0, 1 or 2 points.

The totals for weighted scores for each individual preference are called points. If a person has a higher total of points for E than I, he/she is classified as an extravert. To determine the difference between points for E or points for I, a formula is used to arrive at a score which is squared. This produces an E preference score, such as E11 or E25. A person with more points for I than for E is classified as an introvert and is said to have I preference scores, such as I1 or I25. The EI preference score is based on the difference between points for E and points for I.

The letters denote which of each pair of choices the person prefers and supposedly has or can potentially develop to the greatest degree. Many times the characteristics associated with a preference are not obvious if the numerical portion of the preference score is low. A low score is indicative of almost equal votes for each pole of the preference.

The letters indicate the direction of the preference, while the number indicates the strength of the preference. For example, preference scores N9 and N41 both demonstrate a preference for intuition, but the N41 denotes in the forced choice format that the respondent reported intuition over sensing more often than the respondent with a score of N9.

Interpretation of MBTI Scores

MBTI scores should not be interpreted quantitively. The scores were designed to show the direction of a preference, not its intensity. In interpreting the numerical portion of the MBTI score, one should not assume that strength of preference implies excellence. In other areas, it is erroneous to assume that a person with a score of N47 has a better command of intuition than a person with a N19 score. A larger score simply means that when forced to make a choice, the respondent is clearer about what he or she preferred.

Letters and Preference Types

The type formula provides letters from all four scores which provide a concise definition of each type (e.g., ISTJ, ESFP). The theory recognizes the value of each type. Each type has its own gifts and strengths. Each type has both good characteristics, functions, and attitudes, as well as specific difficulties which can arise if a type is not totally developed or used appropriately.

Selection of MBTI Form

The MBTI is published in three versions - Form F (166 items), Form G (126 items), and Form AV, the Abbreviated Version which is self scoring (50 items). Forms F and G contain research items as well as the items scored for type; Form AV does not contain research items. Forms G and F are almost identical, but in Form G items are rearranged so that the items which best predict total type are at the beginning thus improving the likelihood that

respondents who are unable to complete the instrument will at least receive accurate reports of their type. In this study, Form G, which is considered the standard form of the MBTI, was used.

Administration of MBTI

The MBTI is virtually self administering. All necessary instructions were given on the cover of the question booklets and on the response sheets. The same response sheet was used for hand scoring and machine scoring.

When group administration of the MBTI was given, the examiner read the instructions aloud and emphasized the need for carefully filling in the identifying information and matching numbers on the response booklet. It was important to have respondents fill in the male or female circle on form G because the T (thinking) F (feeling) questions carry different weights as a function of gender. The examiner made it clear that only one answer was to be given to any question except for the one question where more than one answer is allowed, item 17 on form G.

The MBTI has no time limit, but those who were making unusually slow progress were encouraged to work rapidly and not study the items at length. The examiner explained questions or meanings of words to students who asked about questions. Group members would not be allowed to discuss the items.

Omissions were discouraged but were permitted if respondents did not question or could not choose an answer. The reason for permitting omissions is

that no items can reliably contribute useful evidence of type unless choices are understood and selected based on the respondent's experiences.

Reliability

Two sets of reliability issues are addressed relative to the MBTI. The first issue deals with the appropriateness of different estimates of internal consistency and of replicability over time. The major interests of most MBTI users is in the consistency of remaining in the same type.

The second set of questions deals with that part of the variance in reliability estimates which is attributable to the characteristics of respondents. The reliability estimates are expected to vary with the respondent's intelligence , with their understanding of themselves and with the quality of their perception and judgment as demonstrated by their achievement. The estimates of internal consistency reliabilities for the continuous scores of the four MBTI scales are acceptable for most samples. The reliabilities are adequate, but somewhat lower for younger samplers and for other populations of individuals who can be considered to be performing at lower levels of achievement or type development.

The internal consistency of the Type Indicator continuous scores (split-half correlations with Spearman-Brown formula corrections) are presented in the manual (Myers, 1985) for samples from high school through college. Correlations for Extroversion-Introversion (EI) ranges from .77 to .87, for Sensing Intuition (SI) from .70 to .87, for Thinking-Feeling (TF) from .44 to .86,

and for Judgment-Perception (JP) from .71 to .84. In Myers' research (1985) underachieving samples exhibited lower internal consistency correlations, particularly on the thinking-feeling preference.

Test retest reliabilities have been reported for two samples. Stricker and Russ (1963) report test retest reliabilities on 41 Amherst students of .73 from EI, .69 for SN, .48 for TF, and .69 for JP. Levy, Murphy, and Carlson (1972) reported test retest reliabilities of Howard University undergraduates after a two month interval. The correlations were as follows:

	MALES	FEMALES
EI	.80	.83
SN	.69	.78
TF	.73	.82
JP	.80	.82

Since no correlational relationships were hypothesized for males and females in this study, these findings are not presented.

According to Lawrence (1982) the Myers-Briggs Type Indicator is probably the most widely used instrument for non-psychiatric populations in the areas of clinical, counseling, and personality testing.

Validity

Since the MBTI was designed to implement Jung's theory of psychological types, its validity is ascertained by its ability to demonstrate relationships and outcomes predicted by theory. Item selection was based on empirical evidence that the items separate persons with opposing preferences.

Data are presented in the MBTI Manual which indicates that the MBTI is correlated with a variety of other measures. Several studies link the MBTI scales with ability, interests, and personality variables (Grant, 1965; Myers & Davis, 1965; and Conray, 1966). The MBTI has been validated by comparing the results with self-assessment of type preferences. Assessments have been based on brief, non-standardized descriptions of type preferences, and on agreement with Myers' type description. The general expectation is that the agreement with the Myers' description is the best test of the MBTI. Thus, self-assessment based on understanding the theory and self-observation has been used as a method for validity or correcting MBTI reports. The MBTI and the Jungian type survey, designed to measure the same Jungian dimensions except for JP, were found to be correlated as follows E .68 ($p < .01$), I .66 ($p < .01$), S .54 ($p < .01$), N .47 ($p < .01$), T .33 ($p < .01$) and F .23 ($p < .05$) (Myers & McCaulley, 1985).

Correlations With Other Measures

Extraversion on the MBTI correlates significantly with other instruments which measure this same attitude such as the Minnesota Multiphasic Inventory (MMPI) and the Maudsley (Myers, 1971). The correlations with these other scales ranges from -.77 to -.40. For the introversion scale the correlations with these other instruments ranges from .75 to .40.

The correlations with the sensing dimension range from -.67 to -.40. Many of the significant correlations with the SN scale are with work related variables rather than psychological variables. For example, sensitivity is correlated with interest inventories scales (in descending order from r = -.67 to r = -.40 such as truck driver, policeman, bricklayer, foreman in industry, farmer, plumber, welder, carpenter, beautician, television repair person, etc). All of these occupations are attractive to sensing types who prefer the concrete rather than the abstract and hands on experience. Many white collar occupations are also attractive to sensing types such as physician assistant, insurance agent, banker, pharmacist, etc.

Intuition which leads to interest in more abstract arenas was found to correlate from (r = .62 to r = .40) with occupations and fields from interest scales that are significantly correlated with intuition which include: psychologist, art and art education, English, music and music education, foreign languages, science, chemistry, physician, psychiatrist, minister, sociologist, physicists and reporter.

On the Thinking-Judgment index, personality characteristics that correlated with thinking ranged from r = -.57 to r = -.40. Occupations on interest inventories which correlated with thinking include geography, chemistry, business, accounting, military, etc. In order to differentiate the different MBTI dimensions, conventional notations for MBTI correlations are used such that

positive correlations are associated with I, N, F or P and **negative correlations** with E, S, T, or J.

The Feeling Judgment Scale has been found to correlate significantly with scales concerned with interest in people including affiliation and sociability. Correlations range from r = .55 to r = .40. Interest scale occupations include teaching, religious activities, and social service, and creative fields such as arts and humanities. The Judging attitude scale is correlated from -.59 to -.40 with personality variables which measure order, self-control, and achievement. Few occupations show strong correlations with J. Scales correlating at least r = .40 are female nurse practitioners and biological sciences.

The Perceptive Attitude is characterized by spontaneity, adaptability, curiosity, and openness to ideas. Scales of personality correlating with P range from r = .57 to r = .40. The negative aspect of P without balancing J is correlated with lack of control and blame avoidance. Occupational scales correlated with P include art, photography, architecture and music.

These results indicate patterns of correlations of MBTI preference scales with other related instruments, measures, occupations and interests. The S and J are found in occupations that demand system and order. The types with I and N appear in more academic fields. Types with N and T appear together in the sciences.

Type and Culture

Jung's theory is concerned with perception and judgment which are information gathering and decision making or in other terms a stimulus and a response. Jung believed that his theory described mental processes common to the entire human species. To the extent that he was correct, type differences should be consistent across cultures.

The Carlson and Levy (1973) studies are significant in this regard because they successfully tested Jungian theory with subjects who were black college students. Myers (in McCaulley, 1985, pp. 66-70) developed a scale to predict success in medical school internships. The scale was developed on mainly black physicians from Howard Medical School and cross validated on mainly white physicians from the University of New Mexico.

Data reported by Ohsawa (1975) with the Japanese version of the MBTI found that in Japan as in this country ST types are found in production management, SF types in sales, and NT types in long-range planning. TJ types are in top executive jobs in both societies.

In summary, the research presented seems to reinforce the notion that the MBTI is in fact measuring what it purports based on Jungian concepts. Although few cross-cultural studies have been completed because of time needed to translate the instrument, the studies conducted thus far seem to support the fact that there is cross-cultural construct validity.

Learning Style Inventory 1985

The Learning Style Inventory revised in 1985 -- "LSI 1985," for short --- is an improved version of the original Learning-Style Inventory which was designed and developed by David A. Kolb. The purpose of the instrument is to help individuals assess their ability to learn from experience.

Experiental Learning Theory and Individual Learning Style The theory of experiential learning provides a model of learning that corresponds with the stages of human growth and development and the structure of human cognition. It conceptualizes the learning process in a way that allows users to identify differences among individual learning styles and corresponding learning environments. The learning model is a dialectic one, founded on the Jungian concept of styles or types, which states that fulfillment in adult development is accomplished by higher level integration and expression of nondominant modes of dealing with the world. (Kolb, 1984).

The essence of the model is a simple description of the learning cycle which shows how experience is translated into concepts which subsequently guide the choice of new experiences. In this model, learning is conceptualized as a four-stage cycle. Immediate concrete experiences form the basis for observation and reflection. These observations are incorporated into concepts from which new implications for action can be deduced. These implications then serve as guides in creating new experiences.

Effective learners need ability in four different areas: Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE). In other words, learners must be capable of involving themselves openly and without bias in new experiences (CE); to view these experiences from a variety of perspectives (RO); to create concepts into sound theories (AC); and to use these theories to make decisions and solve problems (AE).

Purpose and Description of the LSI 1985

The Learning-Style Inventory designed by Kolb (1985) is designed to measure the extent to which individual's display the learning styles derived from experiential learning theory. The test has three objectives. First, since the test is brief and straightforward, it can be used in discussing the learning process with individuals and providing feedback as well as for research purposes. Second, the test is designed in such a way that individual's respond to it somewhat as they might in an actual learning situation: it requires them to resolve the tensions between the abstract-concrete and active-reflective orientations. Due to this fact, the LSI requires respondents to rank-order their preferences. Third, it was hoped that the learning styles measures would predict behavior in a way most consistent with the theory of experiential learning.

Scoring

The test is a twelve item questionnaire in which respondents attempt to describe their learning style. Each item asks respondents to rank order four sentence endings that correspond to the four learning modes--Concrete Experience (characterized by feeling), Reflective Observation (watching), Abstract Conceptualization (thinking), and Active Experimentation (doing).

The LSI (1985) measures an individual's relative emphasis on the four learning orientations -- CE, RO, AC, and 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).

For example, each of the twelve sentences has four endings all of which are ranked ordered from 1 to 4. The rankings indicate the following:

1) 4 = most like you
2) 3 = second most like you
3) 2 = third most like you
4) 1 = least like you

An example of an LSI item is 1: When I learn: __4__ I am happy; __1__ I am fast; __2__ I am logical; __3__ I am careful.

Although the respondents rank order the statements across, the instrument is designed in such a way that the four rankings across form four columns down. Each column represents one of the four learning styles. The

resulting raw scores will range from 12 to 48. Combination scores are then derived by subtracting:

AC - CE = Abstract Conceptualization minus Concrete Experience
AE - RO = Active Experimentation minus Reflective Observation

These scores will range from +36 to -36. A positive score of the AC-CE scale indicates that a person is more abstract. A negative score on the AC-CE scale indicates that a person is more concrete. Similarly, a positive or negative score on the AE-RO scale indicates that a person is more active or reflective.

Since no single mode usually describes a person's learning style, the LSI combines scores to determine the following learning styles:

Accommodator
Diverger
Converger
Assimilator

Using a four quadrant grid the combination scores AC-CE and AE-RO are plotted and their point of intersection determined. Each of the aforementioned learning styles falls within one of the four quadrants. The closer one's data point to the center of the grid, the more balanced the learning style. The four learning styles are described as follows:

1. Converger: People who are best at finding practical uses for ideas and theories;

2. Diverger: People who are best at viewing concrete situations from many different points of view;

3. Assimilator: People who are best at understanding a wide range of information and putting it into concise logical form; and

4. Accommodator: People who learn primarily from "hands-on experience. The Learning Style Inventory is based on theories of thinking and creativity such as Piaget. This is reflected in its terminology assimilation and accommodation which originated in Jean Piaget's definition of intelligence as the balance between the process of adapting concepts to fit the external world (accommodation) and the process of fitting observations of the world into existing concepts (assimilation).

Administration

The LSI is designed to be self-administering with simple instructions and an example. It takes about ten minutes to complete. Two points are emphasized during the administration:

1. There are no right or wrong answers; and

2. All sentence endings must be rank ordered for each statement and there can not be ties.

Reliability and Validity

The four basic scales and two combination scores all show very good internal reliability as measured by Cronbach's Standardized Scale Alpha (n = 268).

Cronbach's Standardized Scale Alpha

Concrete Experience (CE) .82
Reflective Observation (RO) .73
Abstract Conceptualization (AC) .83
Active Experimentation (AE) .78
Abstract - Concrete (AC-CE) .88
Active-Reflective (AE-RO) .81

In terms of validity strong correlations were found between the Original LSI ("OLSI") and the Revised Version.

	Split Half Reliability Six OLSI & New Items	Correlation Between OLSI and Total LSI, 1985
Concrete Experiences (CE)	.81	.89
Reflective Observation (RO)	.71	.87
Abstract Conceptualization (AC)	.84	.92
Active Experimentation (AE)	.83	.92
Abstract-Concrete (AC-CE)	.85	.92
Active-Reflective (AE+RO)	.82	.93

Norms of the LSI 1985

The norm group for the LSI was based on a sample of 1,446 adults between the ages of 18-60. The sample consisted of 638 men and 801 women from diverse ethnic groups.

Research Design/Data Analysis

The research design for the study was a casual - comparative or "ex-post facto" design. A 2 X 2 X 3 X 3 Multivariate Analysis of Covariance was performed on the data. The independent measures were gender (two levels) male, female; race (two levels) black and white; grades (three levels) high, medium and low; and size of high school; (three levels) small, medium and large.

The dependent measures on the MBTI were sensing-intuition, introversion-extroversion; thinking-feeling; judging-perception. The dependent measures on the LSI were abstract conceptualization - concrete experience; and active experimentation - reflective observation. ACT scores were used as a covariate since the ACT score is a comparable analogue to IQ scores which were unavailable. Covarying on ACT scores also controlled for initial group differences in achievement. An alpha level was set at ($p < .05$). Scores on the MBTI and LSI were used to classify students on various dimensions of the MBTI and various modes of the LSI.

The MANCOVA was deemed the most appropriate analysis for this study because it adjusts the comparison group means to account for differences

between the groups on the concomitant variable (the covariate). In addition, a multivariate analysis of covariance allows several dependent variables to be analyzed at the same time. Separate ANOVAs were conducted for each of the dependent measures for the MANCOVAs which yielded significant differences.

Procedures

Subjects in this study were students in English Composition I classes at four state supported universities in the south central part of the United States. Subjects were told that the study was about how people learn. They were told that their participation was entirely voluntary. It was pointed out that there were no "right" or "wrong" answers to the questions, and anonymity was assured for all who participate.

The MBTI was administered first and then LSI were in groups of 10-25 in secured areas for testing in English Composition classes at each of the universities. Participants were asked to fill out the demographic form shown on Appendix A.

Each participant was given form G of the MBTI, an answer sheet and allowed ample time to complete the form. Following completion of the MBTI, the Learning Style Inventory (LSI) was given. Participants requesting results were sent a written report detailing their MBTI preference type which detailed the characteristics associated with each type. In addition, students requesting results received their learning profile which identified their preferred learning

mode. (See Appendix C for characteristics associated with the four LSI learning styles: Accommodator, Diverger, Coverger, Assimilator.) Participants were thanked for agreeing to be included in the study.

Summary

This chapter presented the methods, procedures, research design, and data analyses employed in this study. Sample selection was discussed with specific information provided on sample size and locale from which the sample was selected. Detailed discussion followed on the MBTI and LSI, which were the instruments administered to determine the learning style of each participant. Finally, supporting data were presented on the reliability and validity of each instrument.

CHAPTER IV

RESULTS

This chapter presents the results of the study. The study was designed to determine if learning style differences exist among black and white college freshmen.

Multivariate Analysis of Covariance was used to test the hypotheses. The SYSTAT MANCOVA package for the Behavioral Sciences was used to analyze the data (Wilkinson, 1986). It was deemed the most appropriate statistic since it employs two or more dependent measures to compare populations and controls for extraneous variance. In this study, ACT scores were used as a covariate to control for initial group differences in achievement. In addition, since matching subjects was not possible due to limitations in the sample size, analysis of covariance was the most appropriate statistic to control for initial differences which might be based on innate ability.

The initial Multivariate Analysis of Covariance was calculated to determine if significant differences, based on race, and controlling for ACT scores existed among the dependent (learning style) measures on the MBTI and LSI.

The dependent measures of the MBTI were: Extraversion-Introversion; Sensing-Intuition; Thinking-Feeling; and Judging-Perceiving. Dependent measures on the LSI were Abstract/Conceptualization-Concrete Experience; and Reflective Observation-Active Experimentation. The independent measure in the initial analysis was race. The multivariate analysis of covariance yielded significant differences based on the Wilks' Lambda test [$F(6, 163) = 4.171$, $p < .001$].

Since this analysis allowed the multivariate null hypothesis to be rejected, subsequent analyses of variance were conducted to determine which of the six dependent measures were contributing to the significant F. An alpha level of .05 was used in all of these analyses.

In addition to the aforementioned analyses, a Pearson Correlation matrix was calculated to examine the relationships among all the variables. A correlation analysis provides information on the degree of association among the variables. These intercorrelations are shown in Table 3 on page 78.

The following correlations were found to be significant at the .05 level: race and gender .16; race and abstract conceptualization/concrete experience (Subscale of the LSI), .21; race and feeling/thinking (Subscale of the MBTI), .19; gender and sensing/intuition, (Subscale of MBTI), -.22; gender and judging/perception (subscale of MBTI), -.14; ACT and GPA, .68; GPA and abstract conceptualization/concrete experience (Subscale of LSI) .19; size of school and thinking/feeling (Subscale of MBTI), -.15; extroversion/introversion

Table 3

Intercorrelations Between the Dependent and Independent Variables*

	Race	Gender	ACT	GPA	SIZE
Race	1.000				
Gender	0.156**	1.000			
ACT	-0.123	0.149	1.000		
GPA	-0.113	0.110	0.675	1.000	
Size	0.014	0.000	0.033	-0.071	1.000
AC-CE	0.212*	-0.040	0.021	0.023	-0.088
CE-R0	-0.246	-0.101	0.098	0.187*	-0.061
EI	-0.088	-0.059	-0.062	0.005	-0.097
SN	-0.047	-0.222*	-0.064	-0.092	0.012
TF	-0.189*	0.025	0.076	0.008	-0.145*
JF	-0.082	-0.142*	-0.108	-0.134	0.134

	AC-CE	CE-RO	EI	SN	TF
AC-CE	1.000				
CE-RO	-0.183	1.000			
EI	-0.015	-0.068	1.000		
SN	-0.014	-0.104	0.195*	1.000	
TF	-0.044	-0.056	0.169*	0.154*	1.000
JP	0.057	-0.118	0.066	0.439*	0.114

	PJ
PJ	1.000

Number of Observations: 175
**$p < .05$

*These data include 28 black males, 50 white males, 50 black females and 47 white females. Twenty-two black males had incomplete data on the LSI and two white females had incomplete data on the ACT and one had incomplete data on GPA. These three white females were not included in the above data, however, the female without GPA data was included in subsequent analyses. The two white females with no ACT scores were eliminated from the sample leaving a total of 48 white females in the study from the original sample of 50. Since all 50 black males provided data on their ACT scores and GPA, they were included in all subsequent analyses. Thus, 50 black males were included in the sample. (See Appendix D for a breakdown of subjects responding by race and gender).

and sensing/intuition (Subscales of MBTI), .20; extroversion/introversion and thinking/feeling (Subscales of MBTI), .17; sensing/intuition and thinking/feeling (Subscales of the MBTI, .15; sensing/intuition and judging/perception (Subscales of MBTI), .44.

Measurement of the LSI and MBTI

The means and standard deviations by race for the two sub-scales of the LSI and the MBTI are reported in Table 4 on page 80. On the LSI, two scales are used to measure learning style. A positive score on AC-CE scale (Abstract/conceptualization and Concrete/Experience) is indicative of a more abstract learning style, whereas a negative score is indicative of a more concrete learning style.

A positive score of the AE-RO scale (active/experience and reflective observation indicates that the individual is an active learner and a negative score indicates that an individual is a more reflective learner. By marking AE-RO, on the two lines of a grid and plotting their point of intersection, or data point, the subject falls within one of four learning styles (See Figure 1 on page 81).

The MBTI describes how people use perception and judgment to process information. Scores must be determined for the four preference types (E-I) Extrovert-Introvert; (S-N) Sensing-Intuitive; (T-F) Thinking-Feeling; J-P) Judging-Perceiving.

Table 4

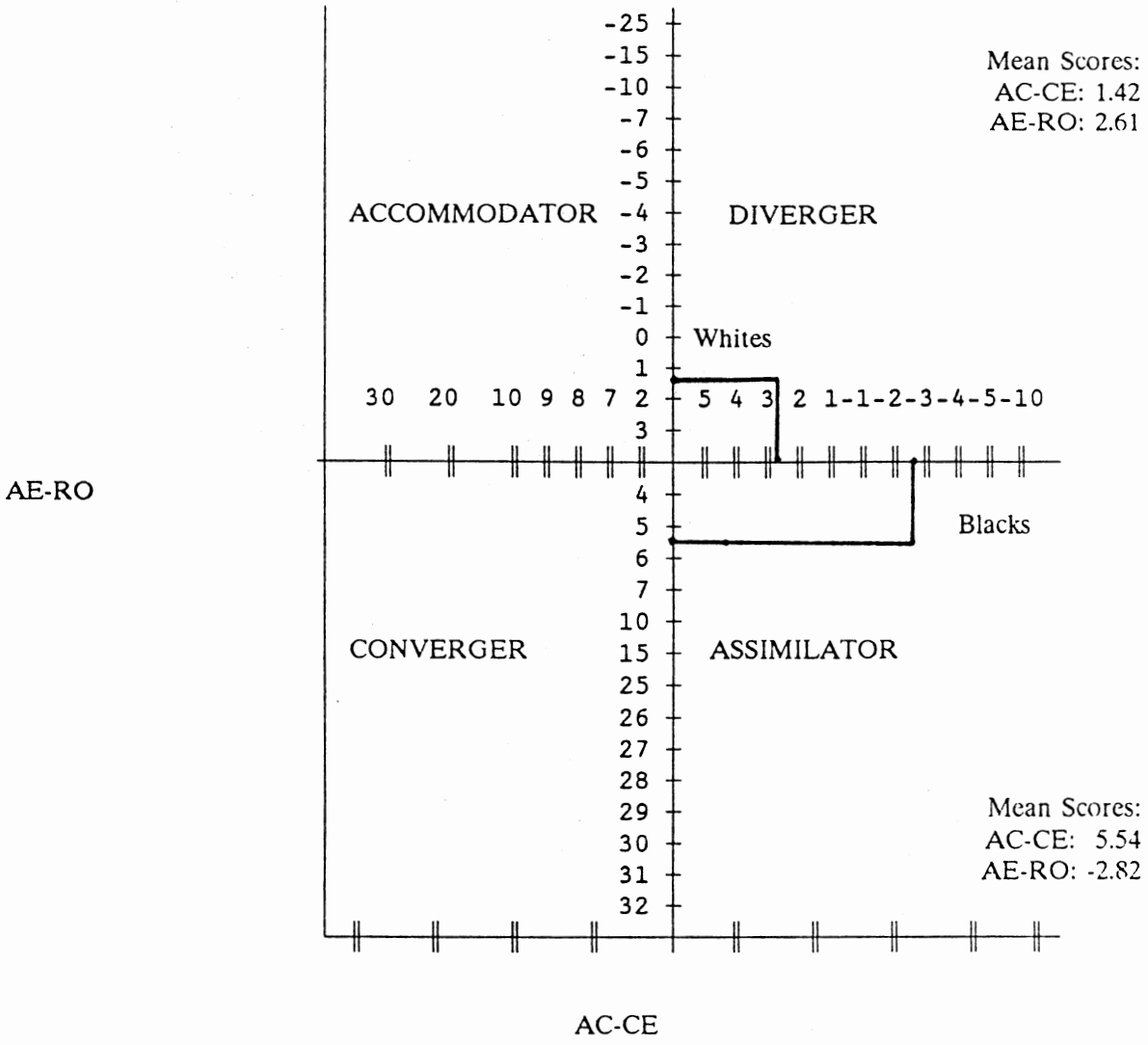
Means and Standard Deviations of Learning Style Measures of the MBTI and LSI* by Race

Learning Style Measures	Blacks		Whites	
	M	SD	M	SD
AC-CE	5.54	8.74	1.42	10.67
AE-RO	-2.82	10.53	2.61	10.79
EI	-2.08	22.42	1.20	23.59
SN	-12.67	22.33	-11.90	22.85
TF	-10.52	22.26	-3.52	21.51
JP	-9.55	25.38	-6.93	24.53

*AC-CE- LSI Subscale: Abstract Conceptualization/Concrete Experience
AE-RO- LSI Subscale: Active Experimentation/Reflective Observation
EI - Myers-Briggs Type Reference-Extraversion/Introversion
SN - Myers-Briggs Type Reference-Sensing/Intuition
TF - Myers-Briggs Type Reference-Thinking/Feeling
JP - Myers-Briggs Type Reference-Judging/Perceptive

Figure 1

Learning Style Type Grid of Black and White College Freshmen



The quadrant of the Learning Style Type Grid into which one's data point falls shows a person's preferred learning style. For example: If his/her AC-CE score was -8 and his/her AE-RO score was +15, his/her style would fall into the Accommodator quadrant. An AC-CE score of +7 and an AE-RO score of +10 would fall into the Converger quadrant. The closer the data point is to the center of the grid, the more balanced the learning style. If the data point falls near any of the far corners of the grid, it is an indication of reliance on one particular learning style.

To obtain the score, points for each pole of the preference are totaled, and a "preference score" is obtained by applying a formula to the differences between the points to determine the more-preferred and less-preferred pole. Since there are four preferences, a type can be identified by the four preferences, a type can be identified by the four letters which show the way the subject prefers to function (McCaulley and Natter, 1981). A type table illustrating the 16 possible four letter profiles is shown on Appendix B.

On the MBTI points for each pole of the preference are scored as positive, ranging from zero to 70. In order to compare group means, students' data had to be polarized by placing extroversion, sensing, thinking, and judging scores on a negative continuum. Thus, these transformed scores ranged from zero to -70. On the other hand, scores for introversion, intuition, feeling, and perceptive were placed from zero to +70 (See Figure 2 on page 83). There were six hypotheses tested in this study which addressed learning style differences. A discussion of each hypothesis follows:

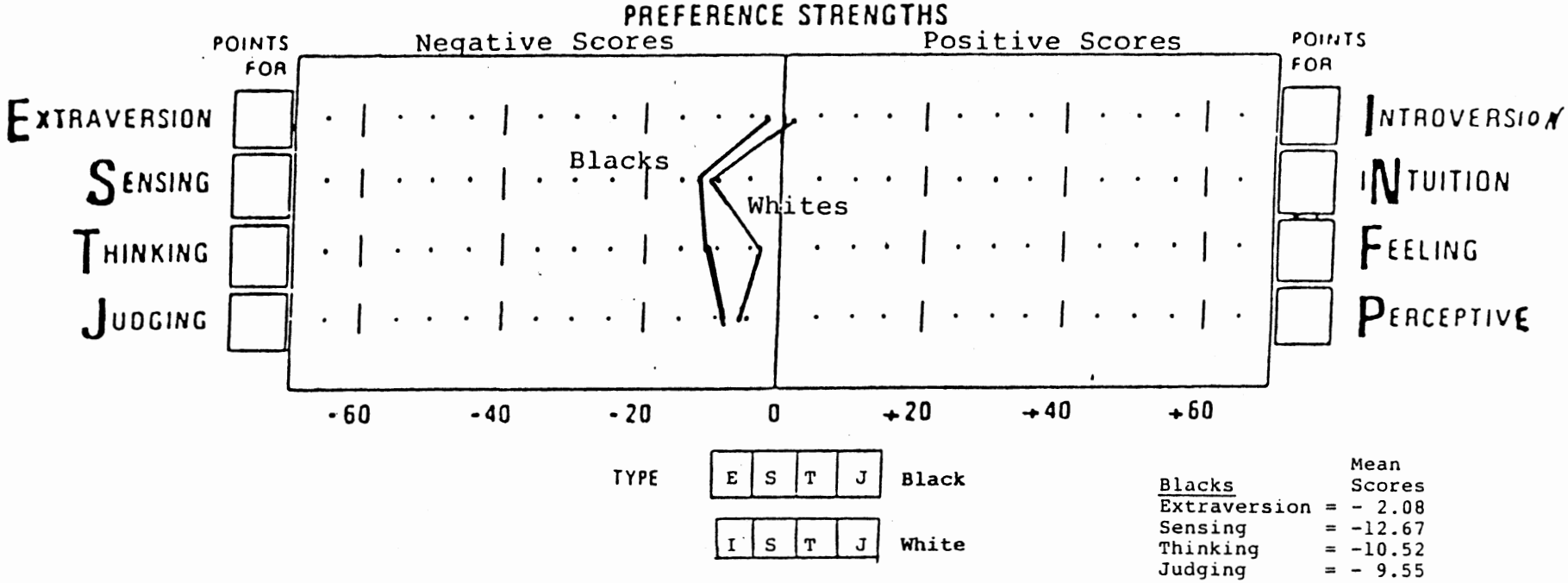
Test of Hypotheses

Hypothesis one assumed that no significant differences exist between the learning styles of black and white college freshmen as measured by the Myers-Briggs Type Indicator and the Learning Style Inventory. Univariate F tests reported in Table 5 on page 84 indicate significant differences by race on the Abstract Conceptualization/Concrete Experience Scale (AC-CE) [$F(1, 168) =$

Figure 2

Mean Preference Strength of Black and White College Freshmen on the Myers-Briggs Type Indicator

Name Black/White College Freshmen Sex: M☒ F☒ Age 18-22 Other _____ Date _____



Blacks	Mean Scores
Extraversion	= - 2.08
Sensing	= -12.67
Thinking	= -10.52
Judging	= - 9.55

Whites	
Introversion	= + 1.20
Sensing	= -11.90
Thinking	= - 3.52
Judging	= - 6.83

Myers, I.B., & McCaulley, M. (1985)
Center for Applications of Psychological Types, Inc.

Table 5

Univariate F Tests For Race and Learning Style

Variable	df	SS	MS	F	P
AC-(a) CE	1	894.46	894.46	9.24	.003*
Error	168	16263.88	96.81		
AE-(b) RO	1	944.41	944.41	8.40	.004*
Error	168	18897.06	122.48		
EI (c)	1	684.99	684.99	1.30	.26
Error	168	88605.75	527.42	0.06	.81
SN (d)	1	29.59	29.59	0.06	.81
Error	168	86762.33	516.44		
TF (e)	1	2946.09	2946.09	6.22	.014*
Error	168	79565.67	473.61		
PJ (f)	1	676.39	676.39	1.17	.28
Error	168	96987.84	577.31		

*$p < .05$
a - Abstract Conceptualization (thinking)
- Concrete Experience (feeling)
b - AE-RO - Active Experience/Reflective Observation
c - Extroversion/Introversion
d - Sensing/Intuition
e - Thinking/Feeling
f - Judging/Perceptive

9.24, $p < .003$] and on the Active Experimentation/Reflective Observation, Scale [$F(1, 168) = 8.23$, $p < .005$], and significant differences on the thinking and feeling index of the MBTI [$F(1, 168) + 6.12$, $p < .014$] (See Table 6 on page 86 for means and standard deviations on the subscales).

Figure 2 on page 83 depicts the mean preference strengths of blacks and whites on the MBTI. Only the thinking-feeling subscale was statistically significant. Although both groups indicated a preference for thinking over feeling, with the mean score for blacks being -10.52 and the mean score for whites being -3.52, blacks preferred thinking over feeling significantly more than did whites. Overall, blacks tended to be more extraverted and sensing than their white counterparts although these differences were not statistically significant.

Significant differences were found between blacks and whites on the two sub-scales of the LSI. The mean score for blacks on the AC-CE scale was 5.54 as compared to 1.42 for whites. The mean score for blacks on the AE-RO scale was -2.82 and 2.61 for whites. These scores placed blacks in the assimilator learning style modality, and whites in the diverger learning style modality. The scale for whites was closer to the center of the grid indicating a more balanced learning style. People who prefer the assimilator style of learning are best at understanding a wide range of information and putting it into concise logical form. Those who prefer the diverger learning modality are best at viewing

Table 6

Univariate F Tests For Gender and Learning Style

Variable	df	SS	MS	F	P
AC-(a) CE	1	122.92	122.92	1.25	.26
Error	168	1643.62	97.84		
AE-(b) RO	1	125.18	125.18	1.11	.29
Error	168	18918.05	112.61*		
EI (c)	1	137.25	137.25	0.26	.61
Error	168	88359.00	525.95		
SN (d)	1	3742.65	3742.65	7.27	.008*
Error	168	86516.30	514.98		
TF (e)	1	174.13	174.13	0.37	.55
Error	168	79771.77	474.83		
PJ (f)	1	1135.89	1135.89	1.95	.17
Error	168	97935.07	582.95		

*p < .05
a - Abstract Conceptualization (thinking)
- Concrete Experience (feeling)
b - AE-RO - Active Experience/Reflective Observation
c - Extroversion/Introversion
d - Sensing/Intuition
e - Thinking/Feeling
f - Judging/Perceptive

concrete situations from many different points of view. As a result of these findings, the null hypothesis is rejected.

Hypothesis two postulates that there are no significant differences between the learning styles of male and female college freshmen. The multivariate analysis of covariance yielded significant differences based on the Wilks' Lambda test [$F(6, 167) = 2.274$, $p < .04$]. Since this analysis allowed the multivariate null to be rejected, analyses of variance were conducted to determine which of the six dependent measures were contributing to the significant F.

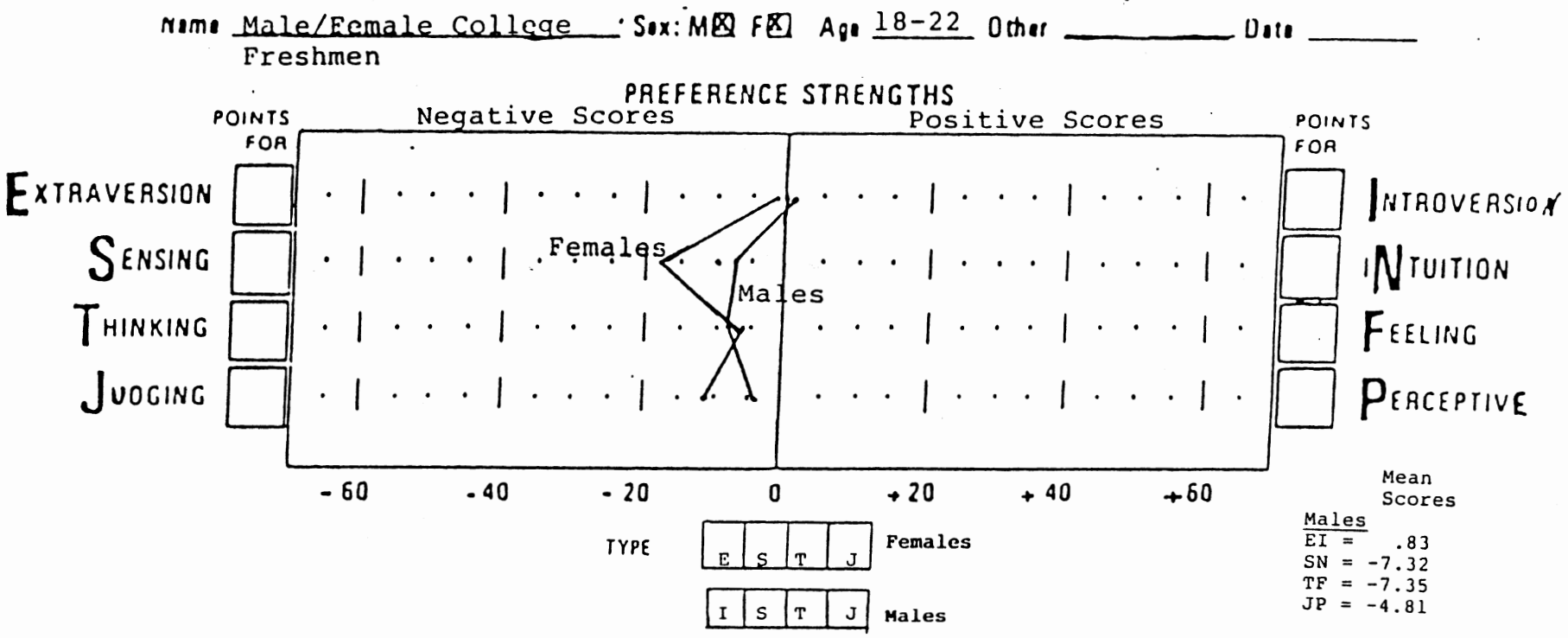
Univariate F tests reported in Table 6 on page 86 indicate significant differences by gender on the sensing/intuition scale of the MBTI [$F(1, 168) = 7.27$, $p < .008$].

Figure 3 on page 88 presents the mean preference strength scores of males and females on the MBTI. The mean score for males on the sensing scale was -7.32 and the mean score for females was -17.30 (See Table 7 on page 89). While both males and females demonstrated more of a preference for sensing, females preferred this modality to a greater extent than males as demonstrated by a higher mean score. Therefore, the null hypothesis is rejected.

Hypothesis three states that there are no significant differences between the learning styles of black males and white males as measured by the Myers-Briggs Type Indicator and the Learning Style Inventory. The multivariate analysis of covariance did not yield significant differences based on the Wilks'

Figure 3

Mean Preference Strength Scores of Male and Female College Freshmen on the Myers-Briggs Type Indicator



Myers, I.B., & McCaulley, M. (1985)
Center for Applications of Psychological Types, Inc.

Table 7

Means and Standard Deviations of Learning Style Measures on the MBTI and LSI by Gender*

Learning Style Measures	Males		Females	
	M	SD	M	SD
AC-CE	3.63	9.93	2.91	10.19
AE-RO	1.41	9.75	-.69	11.83
EI	.83	22.87	-1.74	23.20
SN	-7.32	21.81	-17.30	22.25
TF	-7.35	22.43	-6.72	21.90
JP	-4.81	26.57	-11.72	22.78

*AC-CE - LSI Subscale: Abstract Conceptualization/Concrete Experience
AE-RO- LSI Subscale: Active Experimentation/Reflective Observation
EI - Myers-Briggs Type Reference-Extraversion/Introversion
SN - Myers-Briggs Type Reference-Sensing/Intuition
TF - Myers-Briggs Type Reference-Thinking/Feeling
JP - Myers-Briggs Type Reference-Judging/Perceptive

Lambda test [$F(6, 163) = 1.00$, $p > .05$]. Therefore, univariate tests were not performed. The null hypothesis was not rejected.

Hypothesis four postulates that there are no significant differences between the learning styles of white females and black females as measured by the Myers-Briggs Type Indicator and the LSI. The multivariate Analysis of Covariance did not yield significant differences based on the Wilks' Lambda test [$F(6, 163) = 1.00$, $p > .05$]. Consequently, univariate tests were not performed. The null hypothesis was not rejected. (See Table 8 on page 91).

Hypothesis five assumes that there are no significant differences between the learning styles of students in small, (0-100); medium, (101-500); and large, (501-1000) high schools. The multivariate analysis of covariance did not yield significant differences based on the F ratio associated with Wilks' Lambda [$F(12, 326) = 1.50$, $p > .05$]. Note that in multivariate analyses, the main effect and interaction of values are equal to the number of dependent variables times what would have been the univariate degrees of freedom. Since the dependent measures (learning style indicators) did not appear to be impacted by school size, analyses of variance were not conducted. The null hypothesis consequently was not rejected.

Hypothesis six states that there are no significant differences between the learning styles of students with high (3.0-4.0); medium, (1.1-2.9); or low,(.00-1.0) grade point averages (See Table 9 on page 92 for means and standard

Table 8

Means and Standard Deviations of Dependent Variables by Race and Gender

	White Male			White Female			Black Male			Black Female		
	N	M	SD	N	M	SD	N	M	SD	N	M	SD
Learning Style Inventory* (Dependent Variables)												
AC-CE	50	1.49	10.66	50	.900	10.76	28	-1.85	8.45	50	4.92	9.26
AC-RO	50	3.49	10.02	50	1.98	11.57	28	6	7.77	50	- 3.36	11.57
Myers-Briggs Type Indicator** (Dependent Variables)												
EI	50	2.4	22.97	49	.020	24.38	50	.74	22.88	50	- 3.42	22.09
NS	50	-6.56	23.20	49	-17.34	21.38	50	-8.08	20.53	50	-17.26	23.29
FT	50	-5.2	21.07	49	- 1.79	22.019	50	9.50	23.71	50	-11.54	20.89
PJ	50	-2.6	22.28	49	-11.34	20.72	50	-7.02	25.95	50	-12.08	24.83

AC - Abstract Conceptualization (thinking)
Experience (feeling)
EI - Extroversion/Introversion
Sensing/Intuition
TF - Thinking/Feeling
JP - Judging/Perceptive

*Scores on the AC-CE subscale of the CE - Concrete LSI range from +29 to -27. Scores on the AE-RO subscale of the LSI range SN - from +28 to -21.

**Scores on the MBTI range from 0 - 70 for each preference. Preference scores are obtained by applying a formula to the differences between the points for the more preferred and less preferred pole.

Table 9

Means and Standard Deviations of Students With High Medium and Low GPAs

	N	M	SD
High GPA (3.0 - 4.0)	30	3.853	176
Medium GPA (1.1 - 2.9)	136	2.861	.393
Low GPA (0.0 - 1.0)	32	1.84	.294
TOTAL	198	2.853	.659

deviations). The multivariate analysis of covariance did not yield significant differences based on the F ratio associated with Wilks' Lambda [F(12, 252) = 1.38]. Student grades whether high, medium or low do not appear to influence learning styles. The null hypothesis, therefore, was not rejected.

Summary

The data analyses revealed significant differences in the learning styles between black and white college freshmen. In particular, both black and white students preferred thinking over feeling on the MBTI. However, for blacks this modality was preferred significantly more often than for whites. Persons who prefer thinking objectively and impersonally analyze facts ordering them in terms of cause and effect. On the other hand, those who prefer feeling weigh values and the importance of choices for oneself and other people.

There was also a trend towards sensing and extravert preferences for blacks as compared to intuition and introvert preferences for whites. These results did not, however, yield significant differences.

Significant differences were found between blacks and whites on both scales of the LSI, AC-CE and AE-RO. The plotting of these scores on the LSI grid revealed that blacks preferred an assimilator mode of processing information, whereas whites preferred a diverger learning style modality. People with this learning style would rather observe situations than take action.

Assimilators are more interested in abstract ideas and concepts and less focused on people.

Significant differences were found in the learning styles of males and females. Females preferred sensing over intuition on the MBTI. Sensing students stress fact over theory and prefer having first hand experiences.

Finally, significant differences in learning styles were not found among those with high, medium, or low grades. Significant differences were also not found among those who attended large, medium or small high schools. Significant differences also did not emerge among black males and white males or white females and black females.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary of the Study

This chapter presents a summary of the study, findings, conclusions and recommendations for future research. This study compared the learning styles of black and white college freshmen to see if there were differences in learning styles. In addition, the study examined the relationship between learning style, race, gender, grades and size of high school between black and white college freshmen in the south central part of the United States. There were 198 freshmen participants in this study, 98 females and 100 males. This included 48 white females, 50 black females, 50 white males, and 50 black males. List wise deletion was done to control for missing data. Twenty-two black males failed to answer all items on the LSI. Their data was deleted from the study. In addition, two white females failed to complete the information on ACT and one failed to provide data on her GPA. The two white females who failed to report ACT scores were eliminated from the study, leaving a final sample of 48 white females out of the original sample of 50.

It was hypothesized that there would be no significant differences between the learning styles of black and white college freshmen. It was also hypothesized

that there would be no significant differences in learning styles between males and females; among students attending small, medium or large high schools; among students with high, medium, and low grade point averages; between white males and black males; and between black females and white females. Multivariate Analyses of Covariance were used to determine if significant differences existed. Learning styles were measured using the Learning Style Inventory (LSI) and the Myers-Briggs Type Indicator (MBTI).

Since attrition rates of blacks students in universities around the country are escalating, it is incumbent upon researchers to begin examining the myriad of factors contributing to the loss of these students. Achievement gaps between black and white students have been documented in the literature by researchers such as Williams (1974), Williams and Rivers (1972), Hale (1986).

Researchers such as Hale (1986) and Piaget seem to support the notion that the culture and environmental context shape and determine an individual's experiences and cognition. Given the differences between many blacks and whites both culturally and within their environmental realms, it seems logical that these factors have a direct impact on learning style differences. Unfortunately, schools and the society in general have been structured to accommodate the culture and environment of the majority population. For students with different learning experiences, adapting and learning within this setting is often difficult and foreign to their own experiences.

Population trends continue to show that minority populations are increasing at significantly faster rates than the majority population. If the society expects to foster efficient and effective workers, scholars and professionals, many of whom will be non-white, for an information processing society, then more attention needs to be directed to meeting the educational needs of these groups. Failure to address this issue will result in a poorer quality of life for all.

Efforts must now be aimed at addressing the root causes of these performance differences. The current study postulated that learning style differences among culturally different groups might be a factor.

Researchers such as Cole and Scribner (1974) suggest that cultural perceptions and values tend to create differences in learning and behavior patterns that may initially be at odds with those expected in school. Other social scientists have suggested that the perceptual processes of blacks differ in style from other groups. (Hale, 1986; Greenwood, 1982; Madler and Stein, 1977). These processes have also been described as learning styles (Ramirez and Castaneda, 1974).

Cohen (1976) suggests that the learning styles of minorities may cause students to behave or respond in a manner that sets them apart from the majority of students. In fact, Witkin (1967) defines learning styles as self-consistent, preferred mode of thinking, perceiving and processing information specific to a different racial or ethnic group. Cole and Scribner (1974) have

noted that cultural perceptions and values tend to create differences in learning and behavior patterns that may initially be at odds with those expected in school.

Majoribanks (1972) found that factors such as achievement, environmental, interaction, intellectual, and standard language development were common sets of influences which could account for a large portion of the variance in learning styles among children from different cultural settings. Dunn and Dunn (1978) suggest that children at an early age have a more dominant learning style, but as they mature into adulthood more diverse learning styles emerge. The literature suggests that by the time a student is a freshman in college, he/she has acquired multiple learning styles; however, under stress, the dominate learning style will emerge.

Some researchers such as Maccoby and Jacklin (1974) also contend that the most salient and irreducible human differences are those which are male and female. Westman (1973), on the other hand, contends that there are no absolute or inherent masculine or feminine behavioral characteristics and that males and females can be equally socialized to possess traditional male characteristics. Because of the male/female socialization process, males will tend to do better on certain test items than females depending on the nature of the items included on the test. Given this fact, learning style differences between

males and females might also be an artifact of the socialization process (Westman, 1973).

Findings

A number of interesting findings emerged from this study. First, learning style differences did emerge between black and white college freshmen. In particular, blacks and whites differed significantly on both subscales of the Learning Style Inventory -- AC-CE; AE-RO. Blacks and whites also differed significantly on the thinking/feeling index of the Myers-Briggs Type Indicator.

There was also a positive correlation between race and abstract conceptualization/concrete experience (subscale of LSI) which was found to be significant. Other positive correlations found to be significant, which supported the overall findings were: (a) race and feeling/thinking (Subscale of MBTI); (b) gender and sensing/intuition (Subscale of MBTI); (c) gender and judging/perception (Subscale of MBTI).

On the MBTI, both blacks and white preferred thinking over feeling, but the preference for blacks was significantly greater than for whites.

The mean scores of the LSI placed blacks in the mode of "assimilator" as a preferred learning style. Whites' mean scores placed them in the "diverger" learning modality. The data points for whites placed them closer the center of the grid, indicating a more balanced learning style.

Significant differences in learning styles were also found between male and female college students. Subsequent analysis of variance indicated that males and females differed on the sensing/intuition scale of the MBTI. Women were found to be more sensing than men. While men preferred the sensing modality, they were closer on the continuum to intuition.

When examining learning style differences among black males and white males, as well as black female and white females, no interaction effects were found. Also differences in the size of the high school did not concurrently result in learning style differences among students who attended large, medium or small high schools. Finally, statistically significant differences in learning styles did not emerge among students' whose GPA was either low, average or high.

Conclusions

In conclusion, within the parameters of this study, one might conclude that learning style differences do exist between blacks and whites, as well as males and females and understanding this perspective might offer answers to educators trying to meet the diverse needs of students. Recognizing that students at all levels bring a myriad of learning styles to the classroom, educators must begin to incorporate a variety of teaching approaches into the classroom at all levels if differences in achievement, especially between black and white students, are to be minimized.

According to Myers (1971), since schools are being told that they are accountable for educating every child, then schools need to begin to recognize that the differences in students' perceptions and judgments impact how they learn. To this extent, the mix of skills and abilities that students bring to the classroom also means that these students bring different needs, interests and motivation, not to mention different degrees of success in school.

Myers (1971) further contends that a major area of concern is between the two kinds of perception, the choice between sensing and intuition. Sensing, a MBTI measure, focuses interest and attention to the five senses. Students who are sensing types are more interested in doing something with tangible objects, than in listening to what someone is saying unless it has to do with action. In contrast, "intuition" types focus more on symbols and words. Sensing children tend to score lower on intelligence tests and make lower grades.

In this study, college freshmen women were found to be more sensing than men. Although statistically nonsignificant, a trend emerged which demonstrated a tendency for blacks to be more sensing than whites. These findings have broader ramifications as teachers and administrators alike develop programs and curricula to meet the needs of all students. To address the needs of sensing, students instruction needs to be explicit. Basic skills should be taught in creative and interactive ways to give every child what help he/she needs. Sensing children have difficulty coping with anything unexplainable. If black

children do tend to be more sensing, special attention should be given to subjects such as math, by providing "hands-on" activities to teach and explain abstract concepts. The infusion of these kinds of approaches into school curricula should result in improved academic performance of black children if this premise is true.

Two academic areas which need immediate attention are math and science. According to Myers (1971), intuitive types outscore sensing types in tests with much theory and abstraction. Given the low numbers of women and blacks in these fields, learning style differences might provide some insights into why women and blacks have not been able to compete as well in those fields. The results of this study indicate that females tend to be more sensing than males and blacks tend to be somewhat more sensing than whites. This seems to imply that educators have not adequately tapped into the learning style differences which might be impeding those groups entry into the fields of math and science.

Both blacks and whites preferred thinking over feeling on the MBTI. However, for blacks, thinking was preferred significantly more than for whites. Myers (1971), reports that there are fewer differences between thinking and feeling types than between sensing and intuitive types. Sensing types also prefer films and television more than intuitive types.

Intuitive types often receive less classroom attention because they grasp content quickly, but then become bored easily. The challenge for educators is to find a more balanced educational approach which challenges all students to reach their potential.

Myers (1971) also noted that extraverts scored significantly lower than introverts on several academic measures including aptitude, reading and mathematics. In this study, since blacks clustered toward the extravert end of the pole more than whites, this issue warrants some discussion. Understanding it may begin to provide insights about why black students are meeting with less academic success in institutions of higher learning than their white counterparts. Myers (1971) notes that extraverts outnumber introverts and that more programs are needed to meet their needs. In addition, extraverts tend to do better on tests applying knowledge than on tests of concepts and ideas. I.Q. measures and other measures of academic achievement usually focus on concepts rather than knowledge. Given this fact, educators need to provide more staff development as well as develop curricula which focus on alternative educational strategies which meet the needs of all students.

Finally, blacks differed significantly from whites on both scales of the LSI: AC-CE and AE-RO. Blacks' mean scores placed them in the assimilator modality, whereas whites were in the diverger modality. Both of these learning styles are accompanied by strengths and weaknesses.

Divergers have imaginative ability, are able to recognize problems and understand people. This group, however, encounters problems when confronted with making a decision or choosing alternatives.

Assimilators are good planners, are good at defining problems and developing theories. They have problems with practical applications. According to Kolb (1981), assimilators would have strengths in education, sociology, law and the ministry. In terms of careers their strengths are in math, physical science and biology.

Divergers have characteristics which fit well into literature, television and journalism. Career choices that seem appropriate according to Kolb (1981) are social work, psychology and personnel management.

The results of the MBTI seem somewhat contradictory to the findings of the LSI. Blacks seem to be less geared to the sciences and math based on results from MBTI. On the other hand, results from the LSI seemed to indicate that blacks learning style is more appropriate for those fields of endeavor.

A few problems arise when trying to compare subjects on these two instruments. First, no studies have been done to determine if in fact the LSI and MBTI are measuring the same types of learning modalities. On the surface, it appears that they are not. Second, by compiling group data, individual differences which contribute to the overall picture may not be as accurate or as sensitive a measure when examining something as complex as learning styles.

Despite these problems, the learning style differences which emerged in this study between black and white students warrants further study and investigation. All children can and do learn; but all children do not learn in the same way.

Recommendations for Educators and Future Research

Based on the results of this study, the following recommendations and suggestions for future research are made:

1. To meet the needs of sensing students, which seems to include many minority students, early intervention needs to begin in the primary grades. Since sensing children have difficulty in math and science because of the symbols and abstract properties, teachers need to find creative ways to attach real objects and persons to the symbols. For the sensing child, things that you can touch and move are real, whereas words and symbols are not.

2. Courses in "Teaching to the Diverse Needs of the Children" need to be required for teacher certification.

3. Staff development in this area needs to be required for renewal of teacher certification.

4. In higher education, workshops and colloquia need to occur which provide an emphasis on creative teaching strategies within the college setting.

5. Teachers need to become more observant of how their students respond and interact in the learning environment. This information then needs to be shared with other teachers.

6. Once teachers understand learning style differences, they can begin to develop students' less dominant perceptions and judgments.

7. Teachers need to develop learning activities and curricula which include aspects of all the learning styles presented in this study as defined in the MBTI.

Research Recommendations

1. An investigation needs to be done to determine if the MBTI and LSI are in fact measuring similar learning styles.

2. More studies need to be done which address learning styles from a cross cultural perspective within and outside of the United States.

3. Research is needed to compare the learning styles of students attending predominantly white universities as compared to historically black universities.

4. More research is needed to further clarify the kinds of teaching approaches most appropriate for the numerous learning styles.

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APPENDIX A

DEMOGRAPHIC DATA ON SUBJECTS AND INTRODUCTORY COMMENTS TO PARTICIPANTS

Thank you for agreeing to participate in this survey. I am interested in collecting information about the different learning styles of college students. Your participation is entirely voluntary, your assistance is greatly appreciated. Your involvement in this study should take about thirty minutes to complete the MBTI and LSI. While there are no "right" or "wrong" answers to these questions, your responses will be kept strictly confidential.

In participating in this study, first, please complete all of the following demographic information. Then carefully read and complete the brief questionnaire that follow. Thank you very much for your cooperation and help.

(1) Sex: Male _____
Female _____

(2) Age: _____

(3) College or University:_____

(4) Racial/Ethnic Identity: Black _____ Caucasian _____

(5) ACT Score: _____

(6) Overall GPA: _____

(7) Size of High School:

Small (50-500)_____ Medium (501-000) _____

Large (1000 and over) _____

APPENDIX B

CHARACTERISTICS FREQUENTLY ASSOCIATED WITH EACH MBTI TYPE

Characteristics frequently associated with each type

	Sensing Types		Intuitive Types	
Introverts	**ISTJ** Serious, quiet, earn success by concentration and thoroughness. Practical, orderly, matter-of-fact, logical, realistic, and dependable. See to it that everything is well organized. Take responsibility. Make up their own minds as to what should be accomplished and work toward it steadily, regardless of protests or distractions.	**ISFJ** Quiet, friendly, responsible, and conscientious. Work devotedly to meet their obligations. Lend stability to any project or group. Thorough, painstaking, accurate. Their interests are usually not technical. Can be patient with necessary details. Loyal, considerate, perceptive, concerned with how other people feel.	**INFJ** Succeed by perseverance, originality, and desire to do whatever is needed or wanted. Put their best efforts into their work. Quietly forceful, conscientious, concerned for others. Respected for their firm principles. Likely to be honored and followed for their clear convictions as to how best to serve the common good.	**INTJ** Usually have original minds and great drive for their own ideas and purposes. In fields that appeal to them, they have a fine power to organize a job and carry it through with or without help. Skeptical, critical, independent, determined, sometimes stubborn. Must learn to yield less important points in order to win the most important.
	ISTP Cool onlookers—quiet, reserved, observing and analyzing life with detached curiosity and unexpected flashes of original humor. Usually interested in cause and effect, how and why mechanical things work, and in organizing facts using logical principles.	**ISFP** Retiring, quietly friendly, sensitive, kind, modest about their abilities. Shun disagreements, do not force their opinions or values on others. Usually do not care to lead but are often loyal followers. Often relaxed about getting things done, because they enjoy the present moment and do not want to spoil it by undue haste or exertion.	**INFP** Full of enthusiasms and loyalties, but seldom talk of these until they know you well. Care about learning, ideas, language, and independent projects of their own. Tend to undertake too much, then somehow get it done. Friendly, but often too absorbed in what they are doing to be sociable. Little concerned with possessions or physical surroundings.	**INTP** Quiet and reserved. Especially enjoy theoretical or scientific pursuits. Like solving problems with logic and analysis. Usually interested mainly in ideas, with little liking for parties or small talk. Tend to have sharply defined interests. Need careers where some strong interest can be used and useful.
Extraverts	**ESTP** Good at on-the-spot problem solving. Do not worry, enjoy whatever comes along. Tend to like mechanical things and sports, with friends on the side. Adaptable, tolerant, generally conservative in values. Dislike long explanations. Are best with real things that can be worked, handled, taken apart, or put together.	**ESFP** Outgoing, easygoing, accepting, friendly, enjoy everything and make things more fun for others by their enjoyment. Like sports and making things happen. Know what's going on and join in eagerly. Find remembering facts easier than mastering theories. Are best in situations that need sound common sense and practical ability with people as well as with things.	**ENFP** Warmly enthusiastic, high-spirited, ingenious, imaginative. Able to do almost anything that interests them. Quick with a solution for any difficulty and ready to help anyone with a problem. Often rely on their ability to improvise instead of preparing in advance. Can usually find compelling reasons for whatever they want.	**ENTP** Quick, ingenious, good at many things. Stimulating company, alert and outspoken. May argue for fun on either side of a question. Resourceful in solving new and challenging problems, but may neglect routine assignments. Apt to turn to one new interest after another. Skillful in finding logical reasons for what they want.
	ESTJ Practical, realistic, matter-of-fact, with a natural head for business or mechanics. Not interested in subjects they see no use for, but can apply themselves when necessary. Like to organize and run activities. May make good administrators, especially if they remember to consider others' feelings and points of view.	**ESFJ** Warm-hearted, talkative, popular, conscientious, born cooperators, active committee members. Need harmony and may be good at creating it. Always doing something nice for someone. Work best with encouragement and praise. Main interest is in things that directly and visibly affect people's lives.	**ENFJ** Responsive and responsible. Generally feel real concern for what others think or want, and try to handle things with due regard for the other person's feelings. Can present a proposal or lead a group discussion with ease and tact. Sociable, popular, sympathetic. Responsive to praise and criticism.	**ENTJ** Hearty, frank, decisive, leaders in activities. Usually good in anything that requires reasoning and intelligent talk, such as public speaking. Are usually well informed and enjoy adding to their fund of knowledge. May sometimes appear more positive and confident than their experience in an area warrants.

Introverts

Extraverts

Myers, I. B. (1971). Psychological type differences in education. Gainsville, FL: Center for Applications of Psychological Types, Inc.

APPENDIX C

THE FORM LSI LEARNING

STYLE TYPES

THE FOUR LEARNING STYLES

CONVERGER

Combines learning steps
ABSTRACT CONCEPTUALIZATION and **ACTIVE EXPERIMENTATION**

People with this learning style are best at finding practical uses for ideas and theories. If this is your preferred learning style, you have the ability to solve problems and make decisions based on finding solutions to questions or problems. You would rather deal with technical tasks and problems than with social and interpersonal issues. These learning skills are important to be effective in specialist and technology careers.

DIVERGER

Combines learning steps of
CONCRETE EXPERIENCE and **REFLECTIVE OBSERVATION**

People with this learning style are best at viewing concrete situations from many different points of view. Their approach to situations is to observe rather than take action. If this is your style, you may enjoy situations that call for generating a wide range of ideas, as in a brainstorming session. You probably have broad cultural interests and like to gather information. This imaginative ability and sensitivity to feelings is needed for effectiveness in the arts, entertainments, and service careers.

ASSIMILATOR

Combines learning steps of
ABSTRACT CONCEPTUALIZATION and **REFLECTIVE OBSERVATION**

People with this learning style are best at understanding a wide range of information and putting it into concise, logical form. If this is your learning style, you probably are less focused on people and more interested in abstract ideas and concepts. Generally, people with this learning style find it more important that a theory have logical soundness than practical values. This learning style is important for effectiveness in information and science careers.

ACCOMMODATOR

Combines learning steps of
CONCRETE EXPERIENCE and **ACTIVE EXPERIMENTATION**

People with this learning style have the ability to learn primarily from "hands-on" experience. If this is your style, you probably enjoy carrying out plans and involving yourself in new and challenging experiences. Your tendency may be to act out "gut" feelings rather than on logical analysis. In solving problems, you may rely more heavily on people for information than on your own technical analysis. This learning style is important for effectiveness in action-oriented careers such as marketing or sales.

Kolb (1985) Learning Style Inventory. Revised edition. Boston, MA: McBer and Company

APPENDIX D

BREAKDOWN OF SUBJECTS RESPONDING BY RACE AND GENDER

BREAKDOWN OF SUBJECTS RESPONDING BY RACE AND GENDER

ACT

	Males	Females	Total
Blacks	50	50	100
Whites	50	48	98
Total	100	98	198

GPA

	Males	Females	Total
Blacks	50	50	100
Whites	50	47	97
Total	100	97	197

BREAKDOWN OF SUBJECTS RESPONDING BY RACE AND GENDER

LSI

	Males	Females	Total
Blacks	28	50	78
Whites	50	48	98
Total	78	98	176

MBTI

	Males	Females	Total
Blacks	50	50	100
Whites	50	48	98
Total	100	98	198

VITA

Wanda Marie Johnson

Candidate for the Degree of

Doctor of Philosophy

THESIS: A COMPARATIVE ANALYSIS OF LEARNING STYLES OF BLACK AND WHITE COLLEGE FRESHMEN

MAJOR FIELD: Applied Behavioral Studies

BIOGRAPHICAL:

Personal Data:

Born in Minden, Louisiana, September 23, 1948, the daughter of Mr. and Mrs. Clyde T. Jacob, Sr.

Education:

Graduated from Douglass High School, Oklahoma City, Oklahoma in May, 1966; received Bachelor of Music Education degree in vocal and instrumental music from Central State University in 1970; received Master of Education degree from Central State University in 1975; enrolled in doctoral program at Oklahoma State University in 1985, completed requirements for the Doctor of Philosophy degree at Oklahoma State University in May, 1989

Professional Experiences:

Vocal Music Teacher, Oklahoma City Public Schools, 1970-72; Vocal Music Teacher for Millwood Public Schools, 1973-77; Human Relations Specialist for Oklahoma City Public Schools, 1977-79; School Counselor, 1979-85; Rogers Middle School, Licensed Professional Counselor, 1986-Present; Assistant Professor, Central State University, 1989.