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The Relationship Between Learning Styles and Student Performance on the Palmetto Achievement Challenge Test in a Low Performing, Low Socioeconomic-Status School

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by

Joseph Lassale Williams

A Dissertation
Submitted to the Graduate Studies Office
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

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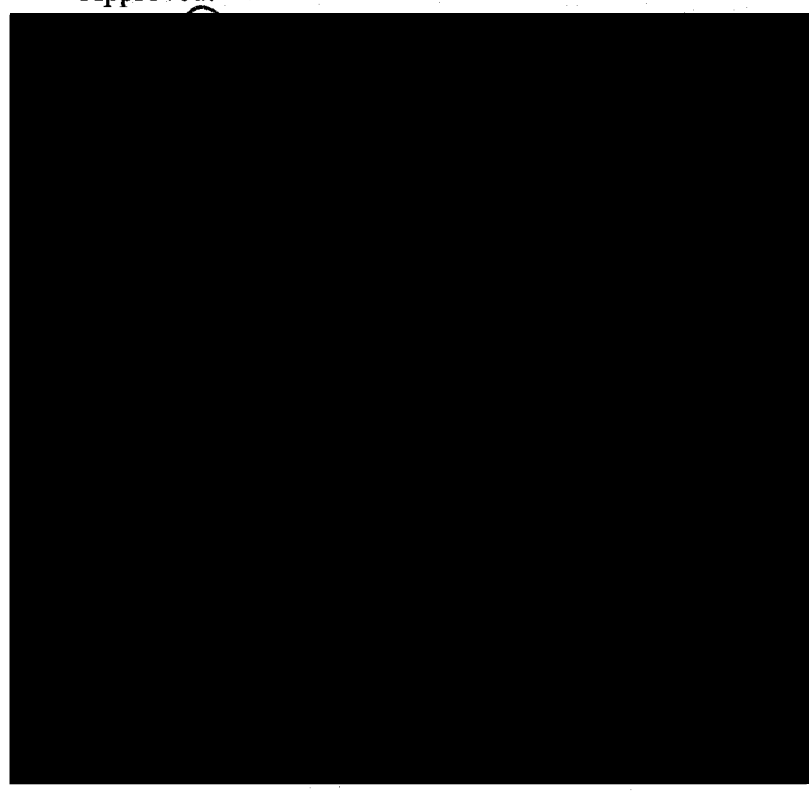

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ABSTRACT

THE RELATIONSHIP BETWEEN LEARNING STYLES AND STUDENT PERFORMANCE ON THE PALMETTO ACHIEVEMENT CHALLENGE TEST IN A LOW PERFORMING, LOW SOCIOECONOMIC-STATUS SCHOOL

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The intention of this research was to bring light to the current state mandated testing, and possible solutions in assisting educators to address the issues of students not meeting the standards. In more general terms, this study is looking to prove to what extent a student's learning style has on their performance on the Palmetto Achievement Challenge Test (PACT). This study analyzed four of the twenty-six learning preference areas identified by the Learning Style Instrument (LSI) of middle school students in a traditional public middle school in seventh grade. The four areas that were looked at were kinesthetic, tactile, auditory, and visual preferences. Subjects on the PACT test that were used in the correlation included science, social studies, English Language Arts (ELA) and math.

This process of investigation intended to reveal the significant or non-significant findings related to the learning styles of middle school students and their performance on this test as outlined by state guidelines. Students were grouped in a proficient and advanced group or a basic and below basic group. In order to complete this study, data was gathered from the LSI and the student's score on certain areas of the PACT test were analyzed. The results rendered no

significant groups except for the social studies kinesthetic group. All other academic groups and the preference areas including the auditory, visual, and tactile for social studies were not significant.

The results may help educators as a whole identify other means of addressing deficiencies that may cause students to perform low on state mandated tests. Educators can use this research data to address the issues of learning styles in preparation and constructing state mandated tests for students across the nation.

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In this world, many accomplishments are achieved by the intestinal fortitude that an individual encompasses within them. Even with this great fortitude, some of the most successful beings attribute their greatness to the support and help of others. With this said, I can only emphasize that this was a long and tiresome journey made possible by the efforts of many. First and foremost I want to thank God for strength, guidance and everlasting love. The trials I encountered as I completed the process were many, but I know through it all you were the reason I triumphed.

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CHAPTER I

INTRODUCTION

According to the National Commission on Mathematics and Science Teaching for the 21st Century (2002), educators across the nation are searching persistently for ways to increase student learning amid the many challenges of a diverse population. Ever impatient lawmakers, spurred by President George Bush, have driven the challenge of improving classroom teaching to the forefront of legislation (Lampert, 2001). In 2002, President Bush made as his top educational priority a reauthorization of the Elementary and Secondary Education Act (ESEA), which is now commonly known as *No Child Left Behind* (NCLB). The guiding principles of this act focused on accountability for student performance, reduction of bureaucracy, increased flexibility, emphasis on proven teaching methods, and empowering parents (Kuschke & Annetta, 2006). It included the expectations that: (a) states needed to create their own standards for what a child should learn and know in grades K-12; (b) reading and math standards needed to be established immediately while science standards must be created and implemented by the 2005-2006 school year; and, (c) states must create tests that are aligned with the standards, and must report student progress yearly (U.S. Department of Education, 2005).

In a study conducted by Grasha (1990), engineering students became bored and inattentive in class, consequently performing poorly on tests, getting discouraged about the courses, the curriculum, and themselves, and in some cases changing to other curricula or dropping out of school. The same issues come into play

when dealing with children who are educated in the public schools of America in grades K-12. The defining learning style of a student can have an ultimate effect on whether or not a student is successful or not in today's educational arena. The way in which educators address and examine the learning styles of these students is critical in determining how they will be viewed and ultimately their interest in becoming possible lifelong learners. According to Felder and Silverman (1988), learning in a structured educational setting may be thought of as a two-step process involving the reception and processing of information. In the reception step, external information (observable through the senses) and internal information (arising introspectively) become available to students, who select the material they will process and ignore the rest. The processing step may involve simple memorization or inductive or deductive reasoning, reflection or action, and introspection or interaction with others (Felder & Silverman, 1988). The outcome is that the material is either "learned" or not learned.

The learning style of an individual may vary depending on what methods are utilized to for to receive and process information. Students preferentially take in and process information in different ways: by seeing and hearing, reflecting and acting, reasoning logically and intuitively, analyzing and visualizing, steadily and in fits and starts (Felder & Silverman, 1988). Several researchers have focused on the extent to which sensory receptors influence learning. According to Grasha (1990) individuals can be classified as one of the following types of learners:

> Auditory learners prefer to learn by listening. Lecturing is the teaching approach that works best for them. Visual learners prefer print material.

> They learn best by reading or responding to visual cues, such as the chalkboard or overhead transparencies. Tactile learners like to manipulate objects. Laboratory or hands-on methods of learning are most appropriate for them. Kinesthetic or whole body learners like to learn through experiential activities. They prefer simulations, exploratory activities, and problem-solving. (p. 111)

Researchers who study the learning styles of socially and culturally diverse populations—students not traditionally a part of the college enrollment—have made observations about the particular ways in which students can learn most effectively (Grasha, 1990). These archetypes, developed to aid the learning of nontraditional students can help instructors be more aware of the needs of their students. In order to avoid assuming that all members of a given group display characteristics that have been associated with the group as a whole, it is important for the instructor to consider carefully whether general characteristics associated with a group of learners are descriptive of a particular student in the course (Adams, Bell, & Griffin,1997).

The work of Gardner (1993) has brought into focus the idea that there are sets of intellectual strengths that can be considered "ways of knowing." How much a given student knows and learns depends on several of these intellectual sets and how they are utilized in a diverse class of learners. The compatibility of the students' characteristics and approaches during learning and the instructor's characteristic approach to teaching increase the agility of multiple intelligences in the learning of reading, writing, mathematics, social studies, and science

(Felder, 1993; Musial, Neiminen, Thomas, & Burke, 2009). The study indicated that when mismatches exist between learning styles of most students in a class and the teaching style of the instructor, the students may become bored and inattentive, do poorly on tests, get discouraged and in some cases, drop out of school.

There is a great deal of theoretical support for the idea that mismatches are common and that they negatively affect learning, learner motivation, and attitude (Peacock, 2001). Research suggested that students whose instruction is not responsive to their learning styles achieve significantly less than children whose instruction is responsive (Dunn & Griggs, 1988). If mismatching occurs, students feel anxious and even physically ill when trying to learn and conceptualize information (Taylor, 1997).

Current research demonstrated that many critics of education blame low achievement directly on the school, teachers, and the instructional methods or programs being used (Hood, 1995). In a study conducted by Wehlage and Rutter (1986) the researchers noted, "the most powerful determinants of dropping out are low expectations and low grades combined with disciplinary problems and truancy being the most common offense" (p. 4). According to Silverman (1994), children who drop out struggle to achieve in their classes and with each passing year the struggle gets harder as subjects elevate in complexity. In many instances, sporadic attendance combined with poor readiness skills for the next grade eventually lead to finally giving up on school.

Stereotypes also come into play when addressing the learning styles of individual's ethnicity or culture. For example, assuming that every Asian American student can succeed at mathematics or that every African American student is an athlete or from an underprivileged background leads to faulty expectations that are communicated to students in subtle ways, often only subconsciously (Adams, Bell & Griffin, 1997). The issue of gender is another variable that is often taken into consideration when the learning styles of students are observed. A review of gender research using Kolb's Learning Style Inventory found that males scored higher on the Abstract Conceptualization Scale indicating a preference for logical thinking and rational evaluation, which are deep strategies. Other studies demonstrated that males out performed females in impersonal learning situations emphasizing theory and systematic analysis (Severiens & Ten Dam, 1994). In contrast, female students using a deep approach (identified as 'comprehension approach') tend to look for personal connections and relevance (identified as 'elaborative processing') with learning material (Meyer & Richardson, 1994).

Many students whose family traditions are rooted in the culture of such places as Africa, Puerto Rico, Mexico, and pre-European America exhibit learning styles that emphasize group cooperation, holistic thinking, a concrete rather than abstract orientation, a valuing of personal knowledge, oral over written tradition, and reliance on imagery and expressiveness to provide an affective component to learning (Adams, Bell, & Griffin, 1997). The findings of this study pointed towards instructors who recognized the strengths of these

cultural orientations and provided opportunities for students to draw upon them as resources. The variance of different cultures can further enhance the learning of students and enrich the learning opportunities through knowledge and understanding. Many majority students have embraced and shared these styles and have profited through expanding their stylistic repertoires (Adams, Bell, & Griffin, 1997).

The CMC Executive Board 2001, recognized in a study the following important findings:

> Standardized test scores reflect the socioeconomic background of a student, more than the academic content learned in school. Given their access and exposure to the mainstream culture, students from advantaged backgrounds tend to correctly answer questions related to what's learned outside of school more often than students who come from less-advantaged situations. Students whose families have high socioeconomic levels often come from well-educated families. In their home environment, they become familiar with academic language and develop high-learning expectations that can facilitate school performance and, more specifically, school testing. Schools that exhibit high standardized test scores are not necessarily effective learning institutions. A close look at schools with high scores often reveals a consistent school population, which would predictably exhibit a high level of performance, especially if the community has a high socioeconomic profile (p. 1).

Current education reform initiatives, in South Carolina and around the nation, heavily rely upon systems of testing and accountability. These tools can be effective means for helping educators benchmark existing performance levels and for setting attainable goals, and they can be used as a basis for offering potent motivations in the form of performance incentives (The Jim Self Center on the Future, 2001).

Over the past two decades, and possibly a longer period of time, South Carolina and the nation have tried to improve education by raising standards and by holding educators and students accountable. The practical expression of assessing progress toward national and state goals has been increased testing. In recent years, the frequency that students are tested and the consequences of test performance have both increased dramatically. Every state in the nation tests students to measure achievement relative to national standards. Additionally, states increasingly are using test results to make important program and funding decisions. According to Kober (2001) over half of the states use test scores, alone or in conjunction with other measures, to rate school performance, allocate rewards, or levy penalties. Tests of vocabulary, reading comprehension, mathematics, and general knowledge revealed much lower scores among children of poverty, those lacking proper nutrition, and lower nutritional levels (Brown & Pollitt, 1996). Kober (2001) studied the results of a Center for Education Policy study on poverty and brain development. The following results were rendered:

> In 1995, almost a full quarter of American children under age three lived in poverty—and this in the most prosperous nation in the world. This fact combined with its implications for early brain development supports recent research that concludes that substantial achievement gaps exist between affluent and poor children even before they start school. These achievement gaps persist after entry to our educational systems, and quite often are exacerbated during the educational process. African American and Hispanic families tend to have higher rates of poverty than Caucasians. African Americans, including those from middle class backgrounds, are more likely to drop out of school than even poor Caucasians. The average score for African American 13-year olds on the National Assessment of Educational Progress (NAEP) mathematics test was more than 10 points below the average score of their Caucasian counterparts, and the average score for Hispanic 9-year olds on the NAEP science test was the equivalent of three grade levels behind the average score for Caucasians (pp. 1-3).

While all students possess all nine intelligences, each child comes to school with different areas developed. Research indicates that children who are poor may come to school with musical or bodily-kinesthetic intelligences more developed due to the types of experiences and modeling children of poverty may have in their home environments. This is also an indicator of the child's learning style and possible strengths and weaknesses. This information can tell teachers what a child's learning style is by indicating how easy or difficult it is to learn when lessons are presented in a certain way. Learning styles also allow teachers

to properly assess student progress (Brualdi, 1996). Excessive testing may be stressed to the exclusion of other forms of evaluation (Searson & Dunn, 2001).

The body of research suggesting that remedial students learn in ways not accommodated by traditional instruction has been growing. Canfield (1976), for instance, found that students enrolled in community college remedial courses were much more likely to be either iconic (visual) or hands on learners than other students. Using a modified version of the Kolb Learning Styles Inventory, McCarthy (1982) found that weaker college students tended to be more visually oriented or more inclined to learn through direct experience than other learners. At present, estimates of the percentage of students who are at-risk of dropping out of school range from 15% in rural communities to 66% in some urban populations (Cairns, Cairns, & Neckerman, 1989). Studies revealed that lack of academic achievement is the single best predictor of dropping out of school (Hahn, 1987; Texas Education Agency, 1986). Further, dozens of studies have found that retaining students actually contributes to greater academic failure (Darling-Hammond, 1998). These studies corroborated each other in indicating that Small children internalized retention as a stigma. One study found that children displayed fears of grade retention to the extent that they noted it as the number 3 worst anxieties following only the fears of blindness and death of a parent (Darling-Hammond, 1998).

There are, however, several unintended consequences for students, who perform poorly on state and local tests. Observable consequences may include (a) increased referrals to special education for services, (b) lowered expectations

of students as learners, (c) narrowing of the curriculum and instruction to focus on the specific learning outcomes assessed in state tests, (d) teaching to tests, (e) using test preparation materials that are closely linked to the assessment without making changes to the curriculum, (f) limiting the range of program options students can participate in because of intensified efforts to concentrate on areas of weakness identified by testing, and (g) the overall impact test scores have on judging whether a student will graduate from school with a standard education diploma (Education Commission of the States, 1998; Lane, Parke, & Stone, 1998; Langenfield, Thurlow, & Scott, 1997; Nelson, 1999).

State tests also become high stakes when they are used for grade-level retention and promotion decisions (Johnson & Thurlow, 2000). Increasingly, states are requiring that schools and school districts use state test scores to determine whether students should be promoted to the next grade level. Several states use test cutoff scores to make student retention and promotion decisions (Johnson & Thurlow, 2000). Persuasive evidence indicates that repeating a grade does not improve the achievement of students with disabilities overall (Allington & McGill-Franzen, 1992; Holmes, 1989). Stakes (1999) argued that if tests are used for promotion decisions, several strategies can help the validity and fairness of test score interpretations: (a) identify at-risk or struggling students (such as students with disabilities) early so they can be targeted for help, (b) provide multiple opportunities for students to demonstrate their knowledge through repeated testing with alternate forms or other appropriate means; and (c)

take into account other relevant information about the student (e.g., school performance or related test information).

To attempt to address some of the concerns mentioned previously, this research study will compare the learning style preferences of a selected number of middle school students using the Learning Style Instrument (LSI) created by Dunn, Dunn, and Price and relate them to their performance on the Palmetto Achievement Challenge Test which is administered in the State of South Carolina.

Statement of the Problem

According to the South Carolina Department of Education's 2006 federal AYP ratings, 38 % of South Carolina's public schools met all of their AYP targets, down from 47 % last year. School principals in South Carolina are mandated to increase student achievement according to the Education Accountability Act in l998 and the No Child Left Behind Act, passed by Congress in 2001.

This study was designed to determine if 7th grade students' learning style had an impact on how they performed on the Palmetto Achievement Challenge Test (PACT) which is required by the state of South Carolina to address accountability issues. The PACT test is administered to students in grades 3- 8, and students must receive at least a basic rating in order to be considered successful for any particular part of the exam. The study focused on students in 7th grade, who received a met or not met rating on the PACT test in Math, English/Language Arts, Science and Social Studies during the 2006-2007 academic years according to specific designated categories developed by the State of South

Carolina. The school of the 7th grade class in the study received two state accountability system ratings, one for absolute performance level and one for improvement rate. The ratings for absolute performance and improvement performance are defined in article 1 of the Education Accountability Act of 1998, Section 59-18-120:

> **Absolute Rating**: The level of a school's academic performance on achievement measures for the current school year. Absolute ratings are calculated by using a mathematical formula that results in an index reflecting the average performance level of students in the school; that is, the percentage of students meeting standards on PACT, the state's standards-based assessment. The absolute index point weights are assigned to the ratings criteria of student attendance, pupil- teacher ratio, parent involvement, and external accreditation those results in an index derived by the state. The ratings are used to describe the level of a school's performance.
>
> Improvement Rating: The level of growth in academic performance when comparing current performance to the previous year's performance (based on longitudinally matched student data and on differences between cohorts of students when longitudinal data are not available). Improvement Ratings also reflect reductions in achievement gaps between majority groups and historically underachieving groups of students as well as sustained high levels of school or district achievement" (p. 5). Ratings consist of e*xcellent*, g*ood, average, below average*, and

u*nsatisfactory* and are used to describe the level of a school's performance.

Excellent – School performance substantially exceeds the standards for progress toward the 2010 SC Performance Goal.

Good – School performance exceeds the standards for progress toward the 2010 SC Performance Goal.

Average – School performance meets the standards for progress toward the 2010 SC Performance Goal.

Below Average – School is in jeopardy of not meeting the standards for progress toward the 2010 SC Performance Goal

Unsatisfactory – School performance fails to meet the standards for progress toward the 2010 SC Performance Goal.

In addition to the state accountability system ratings, each school and district will receive an indicator of Adequate Yearly Progress (AYP) based on the requirements of the federal No Child Left Behind (NCLB) legislation. AYP specifies annual targets for the testing and achievement of all students and of specific demographic subgroups. Information regarding the AYP indicators is available from the South Carolina Department of Education (www.myscschools.com).

Purpose of the Study

Educators have, for many years, noticed that some students prefer certain methods of learning more than others. These traits, referred to as *learning styles*, are simply different approaches or ways of learning. Grasha (1996) has defined

learning styles as, "personal qualities that influence a student's ability to acquire information, to interact with peers and the teacher, and otherwise participate in learning experiences" (p. 41). Blackmore (1996) suggested that one of the first things educators can do to aid the learning process is to simply be aware that there are diverse learning styles in the student population. According to Gardner (1993) a single state mandated test score omits student achievement results from daily class work throughout a school year. Test results tend to emphasize verbal intelligence. There are additional intelligences which may be used by students to show what has been learned. Thus, multiple means should be used to ascertain student achievement.

The ultimate goal of this study is to provide educators in South Carolina with valuable data to the correlation between student learning styles and their performance on the PACT test. The general purpose of this study is to determine if a student's preferred learning style has direct effect on their performance on state mandated tests. The specific purposes of this study are:

1. to determine if students, based on their learning styles, obtain a certain rating on certain portions of the PACT test.
2. to determine if students that share learning styles scored proficient or advanced on certain subject areas of the PACT test.
3. To compare tactile and kinesthetic learners' performance on the Mathematics and Science portions of the PACT test versus their performance on the ELA and Social Studies portions.

4. To compare auditory and visual learners performance on the ELA and Social Studies portions of the test versus their performance on the Science and Mathematics portions.

Hypotheses

The following hypotheses were formulated for this study:

H1: Students who score proficient or advanced and those who score basic or below on the Mathematics portion of the PACT test, differ significantly in the auditory, visual, tactile and kinesthetic areas as measured by the Learning Style Inventory.

H2: Students who score proficient or advanced and those who score basic or below on the English Language Arts portion of the PACT test, differ significantly in the auditory, visual, tactile and kinesthetic areas as measured by the Learning Style Inventory.

H3: Students who score proficient or advanced and those who score basic or below on the Science portion of the PACT test, differ significantly in the auditory, visual, tactile and kinesthetic areas as measured by the Learning Style Inventory.

H4: Students who score proficient or advanced and those who score basic or below on the Social Studies portion of the PACT test, differ significantly in the auditory, visual, tactile and kinesthetic areas as measured by the Learning Style Inventory.

Definitions of Terms

Absolute rating. Absolute ratings report the school's levels of student performance during a school year measured against the 2010 education goal of the federal government. A school's rating can be Excellent, Good, Average, Below Average or Unsatisfactory.

Advanced rating. The student exceeded expectations for student performance based on the South Carolina curriculum standards.

Auditory modality preference. Individuals who prefer to learn primarily through hearing.

Authority figure preference. A learner's level of need for the presence of a teacher or other authority figure while learning.

Basic rating. The student has met minimum expectations for student performance based on the South Carolina curriculum standards.

Below basic rating. The student has not met minimum expectations for student performance based on the South Carolina curriculum standards.

Intake preference. The need to take in food or beverage while learning.

Kinesthetic modality preference. Learners that prefer to bodily movement while learning.

Learning style. The way each person acquires, retains, and retrieves information.

Middle school student. In South Carolina a middle school student is defined as on enrolled in grades 6-8.

Mobility preference. The need to move around during the learning process.

Motivation. The motive or source driving a student's desire to learn.

Multisensory Instructional Package (MIP). An instructional package designed to individualize learning through direct appeal to personal learning styles.

No Child Left Behind (NCLB). The No Child Left Behind Act of 2001 (PL 107-110) is the reauthorization of a number of federal programs that strive to improve the performance of America's primary and secondary schools by increasing the standards of accountability for states, school districts, and schools, as well as providing parents more flexibility in choosing which schools their children will attend

Noise level. The level of tolerance for any sound extraneous from planned instruction.

Palmetto Achievement Challenge Test (PACT). Standards-based accountability measurement of student achievement in four core academic areas-English language arts, mathematics, science and social studies.

Proficient rating. The student has met expectations for student performance based on the South Carolina curriculum standards.

School report cards. A protocol that provides educators and citizens with information to evaluate performance of schools.

Tactile modality preference- Learners that prefer to use touching or feeling while learning.

Visual modality preference. The learner's preference to learn primarily by seeing.

Assumptions

The following assumptions were made regarding the proposed study:

1) The participants in this study responded truthfully to the instrument used in this study.
2) The participants in this study who were enrolled in this middle school answered the PACT test to the best of their ability.
3) The participants in this study who were enrolled in this middle school are performing at different academic levels.

Delimitations of Study

The current research was a comparative study on one traditional middle school in the state of South Carolina. The school serves middle grade students in grades 6-8. The variables of the study were delimited to data that were collected from using the Learning Style Inventory instrument created by Dunn and Dunn. The most notable delimitations to the study were the student performance on the PACT test that was delimited to one testing year, and the one 7^{th} grade class utilized in the study.

Justification of the Study

The significance of this study can be directly related to the accountability issues that schools of the nation are faced with today. Accountability for students' learning has been mandated by the federal and local state governments are charged with assessing the needs of their districts to ensure policies and procedures are enforced in schools and class. The results of this study will possibly help educators to identify ways to assess student achievement other than through state mandated testing. It may also open up suggestions for

creating tests that cater to the learning styles of all students. As a whole this may help improve the quality of education for all students and help them to become more interested in the learning process once they experience initial success on these tests.

CHAPTER II

REVIEW OF LITERATURE

This chapter provides a through review of the literature and research available on learning styles. The chapter is divided into seven sections. The first section provides a review of the literature and research studies on the explanation of learning styles. The second section provides a review of the significance of learning styles. The third section speaks to the learning styles of middle school students. The fourth section describes the Dun and Dun Learning Style Model and provides the research studies on the model. The fifth section describes the Palmetto Achievement Challenge Test (PACT). The sixth section provides information on the testing in middle grades. The seventh section provides the literature and research studies on low performing schools and the socioeconomic status.

Explanation of Learning Styles

Students have different levels of motivation, different attitudes about teaching and learning, and different responses to specific classroom environments and instructional practices. Learning styles are "characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (Keefe, 1979). The concept of learning styles has been applied to a wide variety of student attributes and differences. Some students are comfortable with theories and abstractions; others feel much more at home with facts and observable

phenomena; some prefer active learning and others lean toward introspection; some prefer visual presentation of information and others prefer verbal explanations.

One learning style is neither preferable nor inferior to another, but is simply different, with different characteristic strengths and weaknesses (Felder & Brent, 2005). Generally, learning styles are thought to represent an individual's unique approach to learning material (Gadt-Johnson & Price, 2000). They are the consistent ways in which students respond to stimuli in the learning environment (Matthews, 1991). Gremli (1996) stated:

> "An individual's learning style is the way that person begins to process, internalize and concentrate on new material." Each person learns in a unique way and there are similarities of course, but "every person has a learning style—it is as individual as a fingerprint" (p. 24).

Individuals learn and process information in different ways. There are many different ways to classify learning styles. An individuals' learning style can be classified into one of the following categories: perceptual modality, information processing, and personality patterns. The categories represent ways to focus on the learner. An explanation of these categories is provided by (Conner, 1995):

> Perceptual modalities define biologically-based reactions to our physical environment and represent the way we most efficiently adopt data. We should learn our perception style so we can seek out information in the format we process most directly. Educators should pay attention to modalities to ensure programs strike all physiologic levels. Information

> processing distinguishes between the way we sense, think, solve problems, and remember information. Each of us has a preferred, consistent, distinct way of perceiving, organizing, and retaining information. Personality patterns focus on attention, emotion, and values. Studying these differences allows us to predict the way we will react and feel about different situations. Perceptual modality refers to the primary way the body takes in information (pp. 10-11).

In the past, researchers identified auditory, visual, kinesthetic, and tactile styles as the areas of learning styles. However, Gardner (1993) increased the categories and established other ways of grouping modalities. He asserts that there is nine modalities or intelligences that link to our individual styles (Conner, 1995). Gardner (1993) suggested humans can be (1) verbal-linguistic (sensitive to the meaning and order of words), (2) musical (sensitive to pitch, melody, rhythm, and tone), (3) logical-mathematical (able to handle chains of reasoning and recognize patterns and order), (4) spatial (perceive the world accurately and try to re-create or transform aspects of that world), (5) bodily-kinesthetic (able to use the body skillfully and handle objects adroitly), (6) interpersonal (understand people and relationships), (7) intrapersonal (possess access to one's emotional life as a means to understand oneself and others), (8) naturalistic (able to perceive details in the natural, physical world with great clarity), or (9) spiritual (able to perceive underlying meanings and symbols within the human context). Most people retain a dominant and an auxiliary learning modality, and rely on those modes to process information at an unconscious level. Very few

individuals are consciously aware of their preferred modality. All persons access through the senses, but generally tend to favor one. For example, learning occurs as information is processed visually (by sight), auditorally (by sound), kinesthetically (by moving), and tactilely (by touch) (Conner, 1995). More detailed and comprehensive definitions of the previous stated is provided by (Conner, 1995):

> Visual learners prefer seeing what they are learning. Pictures and images help them understand ideas and information better than explanations. A drawing may help more than a discussion about the same. When someone explains something to a visual learner, he or she may create a mental picture of what the person talking describes. You may watch a speaker talk, as well as listen to what he or she says. Auditory learners prefer spoken messages. Auditory learners need to hear their own voice to process the information. Auditory listeners remember things said to them and make the information their own. They may even carry on mental dialogues and determine how to continue by thinking back on the words of others. Kinesthetic learners want to sense the position and movement of what they are working on. Tactile learners want to touch. Even if kinesthetic or tactile learners don't get much from the discussion or the written materials, they may catch up and exceed the lesson plan by working through scenarios and labs (pp. 11-12).

A learning style approach places emphasis on students' strengths, rather than their deficiencies (Hickson & Baltimore, 1996). Dunn and Dunn (1999)

defined learning style as the way in which each person begins to concentrate on, process, internalize, and remember new and difficult academic content. It supposes diverse elements that are not necessarily opposites or extremes (Riding & Cheema, 1991). Twenty-one different elements can affect how each person learns new and difficult material. Most adolescents can learn subject matter that is easy for them even if the teachers use an approach that is less than ideal, but even adults cannot master new and difficult academic material without using their learning-style strengths (Dunn and Dunn 1999).

According to Dunn and Dunn (1993), these elements are divided into five groups that either stimulate or inhibit learning. Somewhere between 5 and 14 of the 21 elements affect most students. These five groups include environmental preferences, emotional predispositions, sociological preferences, physiological characteristics, and processing style. Explanations of these groups according to (Dunn 2001) are:

> Environmental preferences are those things in the environment that may affect a student learning. Some of these factors may include sounds, lighting, temperature, the type of seating or the preferred sitting style. Emotional predispositions question whether or not students are motivated in school. With this motivation comes the student's work ethics, being a persistent worker until completed or frequently needing breaks. Many students according to their emotional predisposition may want to instructors to tell them what to do and serve as an authoritarian in the classroom. Others may want to do things their way with no formal

> instructions with more freedom in completing assignments. A student's sociological preferences deal with how they interact with other individuals involved with their learning process. These students may choose to learn alone or with other peers. Some may choose to learn with peer groups while others prefer a collegial or authoritative adult. Along with whom they prefer to learn with, sociological preferences also question if students elect to learn in many different ways or through patterns and routines. The physiological characteristics look at a student's perceptual strengths or what method of learning is their best source for taking information in. A student may be an auditory, visual, tactual, or kinesthetic learner. Time-of-day energy highs and lows as well as intake requirements are associated with these characteristics as well. Finally a student's processing style looks at the way student process this information they have received. Students may process information sequentially (analytically) or holistically (globally through stories, drama, humor, illustrations, or games) (p.20).

Students adapt their learning activities to the specific task demands at hand (Entwistle & Ramsden, 1983). These are related to precise conducts applied to a certain moment of a process (Perkins, 1985), and in agreement with some authors (Brew & McCormick, 1979; Barron, 1985), to strategies, which the students use differentially in order to learn in certain situations. According to Kinsella (1995), "learning styles are influenced by both nature and nurture and encompass behavioral, perceptual, cognitive concept-forming and affective

aspects" (p. 171). Gregorc (1979) contended that learning styles emerge from inborn, natural dispositions or proclivities. As learners, the most important message gathered from processing styles is to use as many different ways and many different tools to present and examine concepts through each individual's physiologic preferences. Further, educators and instructional designers need to build courses and programs that address multiple learning styles (Conner, 1995).

Significance of Learning Styles

The concept of learning styles arises from the general acceptance that each person learns in a variety of ways (process), and those ways can be identified. Through the modalities, teachers can teach in ways that capitalized on student preferences. If educators begin with a position of strength (preferred learning style), students can be exposed to other ways of learning and expand their repertories as they overcome weaknesses (Gagnon & Collay, 2006).

People not only learn at different rates, but also in different ways. Teaching to accommodate different learning styles helps teachers reach student's individual learning and developmental needs. Research demonstrated (Gregory & Chapman, 2002) that students who needed special assistance received instruction through their preferred learning style during instruction process and excelled in achievement. Teachers also planned instruction carefully to make certain that all students had an opportunity to learn through their own preferred styles. Once students' understood their learning styles, teachers encouraged them to use their strengths and adjusted teaching and learning approaches to achieve maximum benefit (Audioblox, 2006). Other psychological and social

scientists approached styles and understanding from a meaning-making perspective. According to Claxton and Murrell (1987):

> Information about style can help faculty become more sensitive to the differences students bring to the classroom. It can also serve as a guide in designing learning experiences that match or mismatch students' styles, depending on the teacher's purpose. Matching is particularly appropriate in working with poorly prepared students and with new college students, as the most attrition occurs in those situations. Some studies show that identifying a student's style and then providing instruction consistent with that style contribute to more effective learning. (p. 5)

A significant body of research (Dunn & Dunn,1992; Dunn, Krimsky, Murray, & Quinn, 1985; Hodges, 1985; Lemon, 1985; Pizzo, 1981) indicated that the achievement of all students could be improved by providing initial instruction in a manner consistent with each student's learning style. Schools across the nation have reversed poor academic achievement by providing failing students with instructional approaches responsive to their learning-style preferences (Dunn & DeBello, 1999). While low socio-economic status (SES) is highly correlated with low achievement, many low SES students are academically successful. These differences in achievement may be associated with differences in learning styles. However, both low SES and learning styles incompatible with traditional instruction are highly associated with school dropouts (Dunn & Griggs, 1988). In a study conducted by Shaugnessy (1998), students that were previously failing or

poor achievers in math or reading, standardized achievement test scores went up tremendously after receiving instruction using their preferred styles.

Research has shown that the acceptance and utilization of learning style differences aid in the promoting of in depth interest and intellectual stimulation (Castellano, 2003). Learning style differences should be considered in every classroom. Differences may vary within cultured groups as well as between them. A study by Robinson, Shore and Enerson (2007) supported cultural variability among groups and cited the advantages of learning style differences: The team reported that:

> Learning style differences were analyzed for *54* African American, 61 third generation Mexican American, and 40 third generation Chinese American sixth-, seventh-, and eighth-grade gifted students in Chicago to determine if there were group differences in preferences for noise, light, visual modality, studying in the afternoon, or persistence (Yong and Ewing, 1992). All groups preferred bright light, studying in the afternoon, a cool and quiet environment, and less mobility. Chinese American students preferred the visual modality more than the other two groups. African Americans expressed a preference for the kinesthetic modality, and Mexican Americans indicated they did not like the auditory modality. At least among these groups of minority students, learning style differences did not vary significantly.
>
> Adapting to such groups would seem to be accommodated easily. On the other hand, in creased use of the kinesthetic and visual modalities might be effective for all three groups. A study of whether achievement actually

improves if accommodation to different learning styles is changed would lend credibility to purposeful modification. Of course, some preferences, such as appropriate light and quiet, should already be in place in all schools.

Learning Styles of Middle School Students

The younger the children, the more likely they are to learn tactually (by touching and manipulating resources) or kinesthetically (by experiencing; Dunn & Dunn, 1993; Dunn, Dunn, & Perrin 1994). Fewer than 12 percent of elementary-age children are auditory learners; few children or adults are capable of remembering even 75 percent of the academic information they hear in a 30 to 40 minute interval. Fewer than 40 percent are visual learners; few children or adults can remember 75 percent of what they read in 30 to 40 minutes. Most adolescent students intrigue the adults, parents and teachers with whom they interact (Minotti, 2005). One stereotype of adolescents is that "they are inattentive, impulsive, and intellectually flighty" (George, Stevenson, Thomason & Beane, 1992). Certainly there are youngsters for whom one or more of these descriptors is accurate, but other adolescents pay attention, complete long-term projects, and pursue scholarly interests seriously (Minotti, 2005). Middle level students often experience multiple difficulties due to hormonal changes in their bodies and mind that occur during adolescence (Dunn, 1998). Research at the middle level indicated that most students are taught in a formal classroom setting through the use of traditional instructional methods such as lecture, assigned reading, drills, and independent practice (Minotti, 2005). Learning style

researchers revealed that many students achieve well in a traditional educational environment, but the majority of students do not (Bauer, 1991).

The older children become, the more their auditory and visual modalities develop (Dunn & Dunn, 1993; Dunn, Dunn, & Perrin, 1994). However, many adult males are neither auditory nor visual learners, but remain essentially tactual or kinesthetic throughout their lives. At least one-third of high-school-age male students remain essentially tactual and kinesthetic learners. Martini (1986) examined the achievement and attitudes of seventh graders who were classified by their perceptual preferences. She revealed that auditory preferents achieved higher test scores by learning the science content with audiotapes, visual preferents achieved higher test scores by reading the printed text, and tactual preferents achieved higher test scores when they received computer-assisted instruction. The tactual preferents evidenced significantly higher test scores with computer-assisted instruction than did either of the other high-achieving groups. This study further revealed that all students had significantly better achievements with multisensory (visual/tactual) approaches than with either auditory or visual approaches (Martini, 1986). Bauer (1991) used a repeated measures experimental design to research the effects of learning-styles based mathematics instruction with a sample of 44 junior high school students with special needs. Students were classified according to their perceptual preferences and were taught through instructional resources that matched and mismatched their strongest modality. Significance was achieved when Bauer used a dual tactual/visual resource to introduce the topic of addition of integers. A split-plot

analysis of variance revealed significant differences in achievement and attitudes. Roberts (2001) explored relationships among student's achievement scores on (a) grade-level science content, (b) science content that was 3 years above grade level, (c) attitudes toward instructional approaches, and (d) learning-style perceptual preferences. Students who used the Multi-sensory Instructional Package (MIP) achieved statistically higher science and attitude toward science test scores than did their traditionally taught classmates, and they retained the information significantly longer and better. Roberts's research corroborated findings that support the use of a multi-sensory approach when one teaches science concepts that are new and difficult (Martini, 1986). According to Farkas (2003):

> The power of evidence supporting the benefits of learning-style methodology is compelling. Numerous cross-curricular, multilevel studies within the last 3 decades reveal that sensory preferences influence the ways in which students learn. The achievement scores of students who were taught with instructional resources that matched their preferred modalities were statistically higher than were the scores attained by students who were not taught with learning-style methods. (p. 44)

Moreover, when students were taught with multi-sensory instructional resources, although initially through their most preferred modality, and then received reinforcement through their secondary or tertiary modality, scores further increased (Dunn, 1998; Kroon, 1985). According to Farkas (2003):

> A number of factors require attention if the education movement of the 21st century is not to befall the same fate as the crusade of the last several decades. The factors include: the quality of meaningful, connected, sound curriculum; characteristics of effective middle schools; attention to the diverse needs or preferences of learners, or both; and a commitment to a variety of teaching and learning modes responsive to students' individual strengths. To conclude, the most prominent instructional approach of the 21st century should be that educators embrace a developmentally responsive curriculum that actively engages learners and complements their diverse learning styles. (p. 45)

Schools that provide instruction through learning-style methods, therefore, offer greater opportunities for students to succeed than do schools that practice traditional teaching and learning, which seems to be an inferior approach.

Dunn and Dunn Learning Style Model

Only three comprehensive learning-styles models exist (Dunn & Dunn, 1992; Hill, 1971; Keefe, 1991). Of those, only the Dunn and Dunn Model identify and prescribe specific approaches for teaching middle school students (Tendy & Geiser, 1998). The Learning-Style Inventory (Dunn, Dunn, & Price, 1997) has proven to be a reliable and valid tool for determining the learning styles of students in grades 5 through 8. The model has an extensive research base being developed since the late 1960s (Farkas, 2003). The Learning Styles Model was developed for use across grade levels to improve the academic performance of all students, and in particular, low achieving students. The

general goal of the model is to improve the effectiveness of instruction through the identification and matching of individual learning styles with appropriate learning opportunities. The Dunn and Dunn Learning Style Model was developed initially for use with high school students, but it is now being used frequently at all grade levels.

Several main principles or theoretical assumptions undergrid the model and provide the appropriate research surrounding its reliability. In the use of the model, teachers, administrators and staff must be committed to certain principles to ensure success. These principles include: (1)most individuals can learn, (2) instructional environments, resources and approaches respond to diversified learning style strengths, (3) everyone has strengths, but different people have very different strengths, (4) individual instructional preferences exist and can be measured reliably, (5) given responsive environments, resources and approaches, students attain statistically higher achievement and attitude test scores in matched, rather than mismatched treatments, (6) most teachers can learn to use learning styles as a cornerstone of their instruction, and (7) many students can learn to capitalize on their learning style strengths when concentrating on new or difficult academic material (Dunn & Dunn, 1993).

The use of the Dunn and Dunn Learning Styles Model involves two main types of activities, (1) the identification of individual learning styles and (2) the planning and implementation of instruction to accommodate individual students' learning style strengths (Dunn, Dunn & Price 1985,1987). Underlying both of these sets of activities is a series of 21 "learning style elements" as defined by

Dunn and Dunn (Dunn, Dunn, & Price, 1985,1987; Carbo, Dunn, & Dunn, 1986; Dunn & Dunn, 1993):

> The twenty-one elements are grouped across five stimuli categories which include environmental preferences, emotional preferences, sociological preferences, physiological preferences, and psychological preferences. Environmental stimuli preferences include sound, light temperature and design preferences. Emotional stimuli preferences consist of motivation, persistence, responsibility and structure preferences. Sociological stimuli preferences are those that involve self, pair, peers/team, adult, and varied preferences. The physiological stimuli preferences include perceptual, intake, time and mobility preferences. The last group of elements, psychological stimuli preferences, includes global/analytic style, hemisphericity preferences, and impulsive/reflective preferences (pp. 37-38).

When it comes to environment, Pizzo (1981) noted that many students require quiet while concentrating on difficult information, others literally learn more with sound than without. For the latter group, music without lyrics provides an atmosphere more conducive to concentrating than do melodies with words (DeGregoris, 1986). Similarly, although many people concentrate better in brightly illuminated rooms, other think better in soft light than in bright light (Dunn & Dunn, 1993). Temperature variations affect individual students differently (Dunn & Dunn, 1993). Some achieve better in warmth and others in cool environments (Murrain, 1983). According to Dunn and Dunn (1993), "Analytics

learn more easily when information is presented step by step in a cumulative sequential pattern that builds toward a conceptual understanding. Globals learn more easily when they either understand the concept first and then can concentrate on the detail, or are introduced to the information with, preferably, a humorous story replete with examples and graphics" (p. 6). Some children are incapable of learning directly from an adult (Dunn & Dunn, 1993):

> These young people were uncomfortable when under pressure to concentrate in either teacher-dominated or authoritative classrooms. They were fearful of failing, embarrassed to show inability, and often too tense to concentrate. For such student, learning either alone or with peers is a better alternative than working directly with their teachers in either an individual or group situation (p. 10).

Research indicated that when students' sociological preferences were identified and the youngsters then were exposed to multiple treatments—both congruent with their identified learning styles—each achieved significantly higher test scores when taught in congruent patterns (Dunn, Beaudry, & Klavas, 1989). According to Dunn and Dunn (2002) Researchers at more than 120 institutions of higher education have examined the Dunn and Dunn Learning-Style Model at every grade level (K-college), in all basic subjects, and with varying levels of academic proficiency. Those data documented that statistically higher standardized achievement test scores prevailed when new and difficult content was taught through varied instructional approaches that complemented students' learning-style preferences (Farkas, 2003).

No Child Left Behind (NCLB)

On January 8, 2002, President George Bush signed the No Child Left Behind Act (NCLB). This act reauthorized and amended federal education programs established under the Elementary and Secondary Education Act (ESEA) of 1965. The major focus of No Child Left Behind 2001 (also known as ESEA) is to provide all children with a fair, equal, and significant opportunity to obtain a high-quality education. The goal of NCLB is for all students to achieve academic proficiency by the year 2014. Proficiency levels are commonly defined by state assessments such as North Carolina's end of course/grade (EOC/EOG) test. According to the NCLB act:

> No Child Left Behind requires each state to define adequate yearly progress for school districts and schools, within the parameters set by Title I. In defining adequate yearly progress, each state sets the minimum levels of improvement--measurable in terms of student performance--that school districts and schools must achieve within time frames specified in the law. (U.S. Department of Education, 2005).

Schools that fail to meet their average yearly progress (AYP) receive penalties ranging from implementation of improvement plans to governmental school take over (Kuschke & Annetta, 2006). In South Carolina school and district report cards are part of the state's education accountability system. They provide schools and communities with information on the progress of schools and districts measured against the 2010 goal of having student achievement ranked in the top half of the states nationally. In order to accomplish this goal,

the state of South Carolina has designed a system to increase the academic performance of all students. This system has five key components which includes academic standards, assessments, public reporting, professional development and technical assistance, and rewards and intervention (South Carolina Education Oversight Committee, 2005). Academic standards define what students should know and be able to do at each grade level in the four core academic areas: English language arts (ELA), mathematics, science and social studies. Assessments measure student mastery of the standards. The assessments used vary by the grade level of the student. The public reporting component includes school and district report cards, evaluation reports, and research studies. Report cards provide schools and communities with information on the progress of schools and districts measured against the 2010 goal. Professional development and technical assistance is provided through teacher training on the content standards and how to teach them as well as support for low performing schools and districts. Through the No Child Left Behind requirements, parents of children in Title One schools that do not meet Adequate Yearly Progress (AYP) requirements for two and three consecutive years are provided options including transfers to other schools or supplementary services for their children.

According to the South Carolina Education Oversight Committee (2005) schools that are rated Below Average or Unsatisfactory are eligible to receive a menu of items including: External review teams coordinated by the SDE; teacher and/or principal specialists or other personnel through the tiered assistance

program, or alternative research-based technical assistance; allocations to implement summer school programs providing additional instruction to students not meeting standards; funding for homework centers; lottery grants for K-5 and 6-8; and grants for teacher professional development. The final component, rewards and intervention, is provided to high performing and rapidly improving schools through the Palmetto Gold and Palmetto Silver Rewards Program. In addition to meeting AYP, schools are also given an absolute rating. Absolute Ratings reports the school's levels of student performance during a school year measured against the 2010 education goal. According to the South Carolina Education Oversight Committee (2005) absolute rating criteria vary by school levels in the state of South Carolina. These variations include:

> For primary schools student attendance rate, pupil-teacher ratios, parent involvement, external accreditation, and professional development play a part in early childhood play a part. For elementary and middle schools (grades 3 – 8) student performance on the PACT has an impact on absolute rating. For high schools the exit exam first attempt passage rates, exit exam longitudinal passage rate, eligibility for LIFE scholarships (to be phased out in 2006) and graduation rate play a big part in rating. Beginning in 2006-2007, the results of end-of-course tests will replace LIFE scholarship eligibility in the calculation of high school ratings. For career and technology centers percentage of students who earn a 2.0 or above on the final course grade, the graduation rate, and the percentage

of graduates who are placed in either postsecondary instruction, military services or employment affect absolute rating. (pp. 20-21)

The Palmetto Achievement Challenge Test (PACT)

The Palmetto Achievement Challenge Test (PACT) is part of South Carolina's statewide assessment program to measure student performance on the state standards in the four core academic area- English language arts (ELA), mathematics, science, and social studies. The test is South Carolina's means of assessing progress toward national educational standards. An accountability system and a statewide test, such as the PACT, are mandated by the state of South Carolina Education Accountability Act of 1998 and the federal No Child Left Behind Act of 2001 (NCLB). The test is one part of a comprehensive approach to improve the curriculum and instruction in South Carolina's schools. It is administered to all students in grades 3-8 each year in the entire state of South Carolina.

Academic progress is measured by a comparison of the PACT scores for schools, districts and the state from year to year. PACT is administered over a two-week testing period during May with two days for English language arts and one day each for other core subject areas. The PACT English language arts and mathematics components include both multiple-choice and constructed-response items. Each ELA sub-components, also, includes one extended writing item. The science and social studies components include only multiple choice items.

The South Carolina Department of Education (SDE) contracts with an experienced company to print, distribute, scan, score and report PACT test results. Computer programming is used to score the multiple-choice questions, and trained professionals score students' constructed response and extended writing. The test instrument results are reported as total scale scores and performance levels for each of the four subjects. For ELA, students also receive a performance level for the reading and writing components. For the PACT, four performance levels have been established to reflect knowledge and skills exhibited by students. Student performance can be categorized as advanced, proficient, basic, or below basic. An advanced rating is defined as student performance exceeding expectations. Proficient is defined as student performance meeting expectations. Basic is defined as student performance meeting minimum performance expectations. Below basic is defined as student performance not meeting minimum performance expectations.

The PACT results are useful in describing student performance in large curricular areas, but additional at the classroom level is necessary for a more complete understanding of student performance on more specific curricular components. Since the PACT tests were developed as standards-based accountability measures, there are limitations to the depth of information that can be provided for individual student or classroom purposes. District and school data can be used to identify overall subject area deficiencies or program improvement.

Testing In Middle Grades

Middle grades education has recently become the focus of research and professional development. Students during this stage of development are making the physiological and cognitive transition from elementary school to high school, which makes middle grades a popular platform for evaluating K-12 education holistically (Kuschke & Annetta, 2006). How middle grades students go through the learning process is thought to be a good indicator for how they will evolve as learners throughout the rest of their academic careers and ultimately this learning process will impact a school's AYP. Some of the dilemmas that middle schools face when designing academic programs that address both AYP and the special physiological and cognitive needs of their students are: How can curricula be designed to benefit the crucial learning stages of middle grades students; What are realistic goals for teachers to "teach for the test" or to teach to the different learning stages of middle grades students; and How much emphasis should be placed on the individual teacher to mold the curriculum versus the state providing the curriculum? How schools address these types of questions will in the end determine how they plan to attain a proficiency rating (U.S. Department of Education, 2005). Testing, assessments, and AYP all pose threats to the middle school classroom environment and to the special learning styles of middle grades students when age-appropriate, student-responsive instructional strategies are marginalized by passive "teach to the test" instruction (Kuschke & Annetta, 2006). According to Wyman (2001) the mismatch between learning and testing styles identifies a problem faced in every school - how to help those students whose preferred learning style does not match the written, visual tests they are

required to take. The reason many students face challenges in school lies in the way tests are structured. The tests are, for the most part, written. Moreover they are increasingly based on multiple-choice questions - because such exams are inexpensive to mark, easy to standardize and meet the increasing demand for assessments, comparisons between schools and national progress benchmarks.

For a child with a linear and visual learning style, such tests present few problems. But children with other learning preferences will be at a major disadvantage. This is because the way they have been learning is at odds with the way they are now being tested. For example, students with a preference for kinesthetic learning and who have stored their learning though physical means are now having to output that learning through a principally visual medium. The practice of teaching directed to each child's unique form of intelligence (known as multiple intelligence teaching) has produced more sensitivity and motivation for the students as they learn (Wyman, 2001). When exam time comes, however, non-visual students taught in their own style run up against a mismatch between how they have learned and the style in which they are being tested. And most have no strategies to cope. When they cannot translate into writing what they have learned in another style, they conclude that they are poor learners and a downward spiral of expectations commences.

Low Performing Schools and their Socioeconomic Status

There is little in the existing literature describing specific characteristics of low-performing schools. The characteristics of low-performing schools depend on the criteria used to define "low performing." In an environment of standards-

based reform, "low performing" often refers to those schools that do not meet the standards established and monitored by the state board of education, or some other authority external to the school (Corollo & McDonald, 2002). Reasons for low performance vary from school to school (Fullan & Stiegelbauer,1991). Common conditions do, however, appear to be present in these schools. The stress is evidenced by low expectations for student achievement, high teacher absenteeism, and high rates of teacher turnover (Corollo & McDonald, 2002).

In the Balfanz, Legters, West and Weber study (2007), low-performing encompassed chronically weak promoting power on the part of schools to decrease the dropout rate, and their capacity or inability to keep students on track to graduation. These conditions included a correlation between promotion as freshmen to senior status and graduation. The study examined the extent to which AYP is a valid and reliable indicator of improvement in low-performing high schools. The study concluded that:

> Rather than effectively address the issues of accountability, there are major shortcomings in AYP as an indicator of improvement, or persistent failure, in our nation's low-performing high schools. They found that 40% of the nation's low-performing high schools made AYP and that these schools tended to be better resourced, smaller, Southern, and less urban than those that did not make AYP. More fine-grained analyses, however, revealed that whether a particular school made AYP depended upon how much subgroup accountability it faces and its NCLB improvement status (p. 590).

State and local standards, though they may be based on common national standards, vary from state to state and locality to locality. Hence, assessments based on state or other standards differ and contribute to varying criteria for low performance as cited by Balfanz, Letgers, West and Weber in their study 2007,. Even given this variety of state and local standards and assessments, when performance is measured by achievement on nationally normed assessments, low-performing schools share some common conditions. These include a correlation between community poverty and stress on the organization of the school (Puma, Karweit, Price, Ricciutti, Thompson, & Vaden-Kiernan, 1997).

For many years, most states have had strategies to support and improve low-performing schools. The recent passage of the 2001 Elementary and Secondary Education Act (ESEA) provides states with an additional opportunity to ensure all schools perform at least at a proficient level. The revised ESEA contains two main components that directly affect low performing schools. The first component is that states must adopt a single statewide system to show that all students are making adequate yearly progress (AYP) towards achieving a state-defined "proficient" level within 12 years. The second major component applies a series of interventions to schools that fail to demonstrate AYP over time (Craciun & Snow-Renner, 2001).

Holding schools accountable for the performance of all students is a cornerstone of the new ESEA. Under the new law, this accountability is based on whether or not schools, districts and states are making adequate yearly progress (AYP) towards the goal of bringing 100% of their students at least to academic

proficiency by the end of the 2013-14 school year. To track progress toward meeting this goal, the new law requires states to establish expectations for AYP. According to the U.S. Department of Education (2005), low-performing schools that fail to make adequate yearly progress (AYP) over time face a variety of interventions that become more drastic upon repeated failure to demonstrate improvement. These interventions are put in place to assist schools in fulfilling the requirement of all students becoming "proficient" in core academic subjects by 2014. The interventions required by legislation according to the US Department of Education (2005) are:

> Schools that do not make AYP for two consecutive years receive technical assistance from the district. These schools must also develop a school improvement plan and provide students with public school choice options if allowed under state law. Schools that do not make AYP for three consecutive years are required to provide supplemental education services to low-achieving, disadvantaged students. The students' parents choose the service, which may include private tutoring. More serious sanctions go into place when schools have not made AYP for four and five consecutive years. These include corrective actions such as replacing relevant staff members, appointing an outside expert to advise the school, implementing a new curriculum or reconstitution.

While the research literature indicates a correlation between community poverty and stress on the organization of the school, these factors do not consistently predict low-performance. In fact, a substantial body of literature describes

characteristics of schools that succeed despite adverse conditions (Cotton, 2000; Reavis & Griffith, 1992). While community poverty is often associated with low-performing schools, a substantial body of literature describes schools that become high performing despite this condition. In studying the characteristics of these high performing schools, organizational and cultural deficits can be hypothesized to occur in low-performing schools (Corollo & McDonald, 2002).

CHAPTER III

METHODOLOGY

Providing educators with useful data concerning the academic performance of middle school students on the Palmetto Achievement Challenge Tests (PACT) in this study serves as the ultimate goal of this research. This causal-comparative study has the purpose of determining the degree to which the dominant learning styles of middle school students have a direct effect on their performance on PACT. It may also open up suggestions for creating tests that cater to the learning styles of all students when it comes to the issue of state mandated testing.

With the recent No Child Left Behind (NCLB) initiative, many schools are losing ground and trying to find are remedy to get their schools out of the red zone. This red zone is a rating which could be unsatisfactory or poor as outlined by the initiative. An argument could be made that the test is not catered to the all students, and how they learn best. Studies supported the fact that students learn differently, but states continue to give them the same mandated test without any accommodations or considerations given to learning styles unless they have an Individualized Education Plan. As a whole, this may help improve the quality of education for all students and help them to become more interested in the learning process once they experience initial success on these tests. This chapter identifies the participants and tells how they were selected, describes the

methods that were used to collect and analyze the data in this study, and describes the details regarding the Learning Style Inventory instrument.

Participants

The participants for this study included a randomly selected group of middle school students from a traditional public middle school in South Carolina. More specifically, the sample population was derived from a middle school in Charleston, South Carolina, which is one of the coastal cities of the area. Middle schools in the state of South Carolina include grades 6 through 8. This middle school is considered to be a Title I school as outlined by federal regulations because seventy three percent or more of the children are receiving free or reduced lunch. The absolute rating of this school at the present time of the study is unsatisfactory, which according to state standards is not acceptable. The ethnic breakdown is 68% African American, 19% Caucasian, 11% Hispanic, and 2% other.

The student body as a whole is performing at grade level in Math and Language Arts. There was a slight gain in Social Studies this school year, but the school is cited as still below state standard. The Science scores are the lowest in the school, and is the most distinguishing factor which is causing the school report card to reflect an unsatisfactory rating. The school also falls short of making AYP because of the unimpressionable science PACT scores. The participants for this study were selected using the convenient sampling method from one grade level which was grade seven. There were 20 students chosen for English Language Arts (ELA) 10 proficient or advanced and 10 basic or below

basic. Twenty were chosen for math to include 10 proficient or advanced and 10 basic or below basic. The science group had a total of 20 students which included 10 proficient or advanced and 10 basic or below basic. Finally, the social studies group had a total of 16 students 7 proficient or advanced and 9 basic or below basic. Initially the goal was to have 24 students for each subject to include 6 for each of the categories. This process was hindered by the lack of individuals willing to participate in the study and the number of students that scored proficient or advanced in each subject area. Twenty-three male students and 14 female made up the proficient and advanced group for a total of 37. The basic and below basic group consisted of 21 females and 18 males for a total of 39 students. This brought the total number of students involved in the study to 76.

Individual lists were compiled for each group with students that had a rating of below basic or basic and proficient or advanced for each subject area. Once these lists were compiled, students were selected from each list randomly until there were a total of forty in each group. Many of the students or their guardians were not willing for them to participate in the study, so this decreased the numbers of participants in each group down. Using the convenient sampling method allowed individuals to volunteer for the study with required school and parent permission. This method of sampling also allowed subjects from the two groups to be observed and possibly answer the hypothesis stated earlier more in depth.

Instrumentation

The Learning Style Inventory (LSI) was used to determine the learning styles of the selected groups of students. The LSI has been used extensively in research on instructional environments (Dunn, 1987). Developed through content and factor analysis, the LSI is a comprehensive approach to the identification of an individual's learning style. The instrument allows analysis of the conditions under which students in grades 3 through 12 prefer to learn through assessment of each of 23 elements of instructional environments to include: immediate environment (noise level, temperature, light, and design); emotionality (motivation, persistence, responsibility, and structure); grouping preferences (learning alone, learning with peers, learning with adults present, learning in combined ways, being motivated by the teacher, and being motivated by a parent); physiological characteristics (auditory, visual, tactile, kinesthetic perceptual preferences, time of day, energy highs or lows, intake, and mobility); and psychological inclinations (global/analytic, hemispheric preference, and impulsive/reflective) (Dunn, Giannitti, Murray, & Rossi, 1989). The LSI uses dichotomous items (e.g., "When I really have a lot of studying to do, I like to work alone" and "I enjoy being with friends when I study") that are rated on a 5-point Likert scale and can be completed in approximately 30 to 40 minutes (Logan, 2002).

Research in 1997 indicated that 95% (21 out of the 22) of the reliabilities are equal to or greater than .60 for the Likert scale English translation in grades 5 through 12. The areas with the highest reliabilities include: noise level, light, temperature, design, motivation, persistence, responsibility, structure, learning

alone/peer-oriented learner, authority figures present, learn in several ways, auditory, visual, tactile, kinesthetic preferences, requires intake, evening/morning, afternoon, needs mobility, parent figure motivated, and teacher motivated. The area with the lowest reliability of .56 is late morning preferences.

Data Collection

The researcher obtained permission and approval from the Human Subjects Protection Review Committee at the University of Southern Mississippi to conduct this study (see Appendix A). A letter was sent to the school addressed to the principal (See Appendix B) and The Department of Assessment and Accountability (See Appendix C) requesting permission to conduct the study via district courier and email. Permission was received from both entities to conduct the study. Once the principal and The Department of Assessment and Accountability Officer agreed, the researcher worked with the guidance department in randomly selecting students from the three groups and three grade levels to participate in the study.

Additionally, the guidance counselors were asked to randomly select students for the study. Once the students were selected, a parental permission slip (see Appendix D) was required by those students to participate in the study. This form was accompanied by a letter (see Appendix E) to the parent or guardian explaining the nature, purpose and reason for the study. Students who did not turn in their permission slips were not allowed to participate in the study. If students did not turn in their permission slips by the time allocated, then the guidance department at the school was asked to select another child to

participate in the study. These permission forms were sent to each principal or his or her designee by the researcher and were collected and analyzed for parental signatures prior to students completing the Learning Style Inventory. The researcher would like to note that no child was permitted to participate without a permission slip.

Once all signed consents were turned in, the researcher administered the LSI to students. This instrument was administered to the students by the guidance counselors and researcher at the school. The students were spaced apart in the school's cafeteria to accommodate all of the students and to ensure security when the instrument was administered. This resulted in one testing session at the school for the study. Before any administration occurred, all of the participants received the same directions (see Appendix F) as to completing the LSI.

The researcher and three counselors walked around to monitor the testing environment. The instrument was administered at a time when there were no other students in the testing environment. This took place during the students' Fine Arts period so they did not miss any academic instruction from core academic classes. Once the instrument was completed and collected, they were mailed to Price Systems, Inc., for scoring purposes. The researcher waited on the results and analyzed the data using the most recent version of SPSS software.

Data Analysis

After the LSI inventories were scored by Price Systems, Inc., descriptive statistics were calculated for the scores received by each group. Price Systems, Inc. sent two computer printouts for group analysis. These reports summarized the elements by subscale for all individuals in the group having standard scores of 60 or more or 40 or lower. The printouts indicated frequency of responses and group percentages. Price Systems Incorporated also sent individual profiles for each student that were administered the instrument. This information arrived in a printed form and on disc for research purposes. The 22 elements reported were different ways or preferences that contributed to students' learning.

The researcher focused on four of the twenty-two elements to include whether or not they were tactile learners, kinesthetic learners, visual learners or auditory learners. The PACT score ratings for each of these students were compared to their learning preference. PACT score ratings are based on a cutoff score for each grade level to determine which category the student will be classified for further analysis. For example, eighth grade students' mathematics scores are reported as 754-800 being below basic, 801-818 is basic, 819-827proficient, and 828-853 is advanced. Univariate F-tests were used to test the significance of each hypothesis at the .05 level of significance using SPSS 15.0 software. Comparisons were made between the different learning styles and student's actual score on the PACT test in the Science, Social Studies, ELA, and Mathematics. A One-Way ANOVA was run for each subject area to include the students that had PACT scores to correlate with it.

CHAPTER IV

ANALYSIS OF DATA

The ultimate goal of this study is to provide educators in South Carolina with valuable data to the correlation between student learning styles and their performance on the PACT test. The general purpose of this study is to determine if a student's preferred learning style has direct effect on their performance on state mandated tests.

Interpretation of Scores on Profile

A total of seventy-six surveys were submitted to Price Learning Systems, Inc. for scoring purposes. Price Learning Systems, Inc. returned an individual profile for each student who completed the survey which included the student's sex, individual identification number (for confidentiality purposes) date inventory was scored, raw score, standard score, area headings, and the groups identification number. A separate graph of the relative location of each person's standard score in each area was also included. The standard score scale ranges from 0 to 80 with a mean of 50 and a standard deviation of 10. Individuals having a standard score of 60 or higher on their preference summary for an area, strongly prefers this as a method to learning new material, studying, or working at difficult tasks. Those that score 40 or lower on the summary contrarily do not prefer these areas as desired preferences to do these things. Price Learning Systems, Inc. characterized the targeted preferences that the study is focusing on for students completing the Learning Style Inventory.

Auditory Preferences

This perceptual area describes students who learn best when initially listening to verbal instruction such as lecture, discussion or a recording.

Visual Preferences

Learners who have visual preferences are those whose primary perceptual strength is visual. This individual can recall what has been read or observed; such learners when asked, for information from printed or diagrammatic material, often can close their eyes and visually recall what they have read or seen earlier.

Tactile Preferences

Students with tactile perceptual strengths need to underline as they read, take notes when they listen, and keep their hands busy - particularly if they also have a low auditory preference.

Kinesthetic Preferences

Learners with kinesthetic preferences require whole-body movement, or real-life experiences to absorb and retain material to be learned. These students learn most easily when they are totally involved. Acting, puppetry, and drama are excellent examples of kinesthetic learning; other examples include building, designing, visiting, interviewing, going on field trips and playing.

Group Summary Reports

The individual student profiles allowed the researcher to group the students into 8 groups with two categories each which represented the percentage of students who scored between 50 or above versus 49 or below. Again these groups only focused on the four preference areas that he researcher chose to

study. The first contains math students who are either proficient or advanced versus those basic or below basic that have a standard score of 50 or above (Table1). The second addresses the same subject area but contains students that have a standard score of 49 or below (Table 2). Group three is composed of English language arts students who have a standard score of 50 or above (Table 3). The next group contains those individuals that scored near the lower ranges of 49 or below (Table 4). The next two groups are made up of individuals whose standard score for science is either 50 or above (Table 5) or 49 or below (Table 6). The final groups are both representative of social studies students and their preferences. One group consists of students whose standard scores are 50 or above (Table7) while the other group has students whose scores are 49 or below (Table 8).

Table 1

Number of math students who scored 50 or above on areas of LSI

LSI Area	Proficient or Advanced	Basic or Below Basic
Tactile	8	3
Auditory	6	6
Visual	2	4
Kinesthetic	6	5

Table 2

Number of math students who scored 49 or below on areas of LSI

LSI Area	Proficient or Advanced	Basic or Below Basic
Tactile	2	7
Auditory	4	4
Visual	8	6

Table 2 (continued)

Kinesthetic	4	5

Students that scored proficient or advanced on the mathematics portion of the PACT test that were identified as tactile learners, outnumbered those that were below basic. This also proved true for students whose preferred learning style was kinesthetic. There was an equal amount of students who were identified as auditory learners that scored proficient or advanced versus basic or below basic. Visual learners who scored basic or below basic, significantly outnumbered those that scored proficient or advanced.

Table 3

Number of ELA students who scored 50 or above on areas of LSI

LSI Area	Proficient or Advanced	Basic or Below Basic
Tactile	7	4
Auditory	6	5
Visual	0	3
Kinesthetic	5	6

Table 4

Number of ELA students who scored 49 or below on areas of LSI

LSI Area	Proficient or Advanced	Basic or Below Basic
Tactile	3	6
Auditory	4	5
Visual	10	7
Kinesthetic	5	4

For ELA students, those that were tactile or visual learners scored better on the PACT test than those that were auditory or kinesthetic. There was only a difference of 1 for students that scored proficient or advanced versus basic or below basic whose learning style was kinesthetic. There were actually no students whose preference was visual that scored proficient or advanced on the ELA section of the PACT test.

Table 5

Number of science students who scored 50 or above on areas of LSI

LSI Area	Proficient or Advanced	Basic or Below Basic
Tactile	7	5
Auditory	4	7
Visual	6	2
Kinesthetic	6	5

Table 6

Number of science students who scored 49 or below on areas of LSI

LSI Area	Proficient or Advanced	Basic or Below Basic
Tactile	3	5
Auditory	6	3
Visual	4	8
Kinesthetic	4	5

Students who scored in the proficient and advanced group on the PACT test rendered preferences that were tactile, visual or kinesthetic. The most preferred area for these individuals was visual while tactile followed next. There was only a difference of 1 for students that scored proficient or advanced versus basic or

below basic whose learning style was kinesthetic. More auditory preferred learners scored basic or below basic on the science portion on the PACT test.

Table 7

Number of soc. studies students who scored 50 or above on areas of LSI

LSI Area	Proficient or Advanced	Basic or Below Basic
Tactile	6	4
Auditory	2	3
Visual	2	4
Kinesthetic	6	3

Table 8

Number of soc. studies students who scored 49 or below on areas of LSI

LSI Area	Proficient or Advanced	Basic or Below Basic
Tactile	1	5
Auditory	5	6
Visual	5	5
Kinesthetic	1	6

The social studies portion of the PACT test was highlighted by majority of the students who scored proficient or advanced being either preferring tactile or kinesthetic methods of learning. There was an equal number of students scoring proficient or advanced that were tactile or kinesthetic, outnumbering those that were auditory or visual. There were few students that scored proficient or advanced on the social studies portion of the PACT test that preferred visual or auditory styles of learning. Again there were an equal number of students scoring proficient or advanced that were auditory or visual learners.

Descriptive Statistics

A series of one-way analysis of variances (ANOVA's) were used to statistically analyze the responses of 76 participants on the Learning Style Inventory. The two factors that were compared for each one were the two scoring groups and the four identified learning preferences. For each subject area, there were two groups, basic or below basic and proficient or advanced. The basic or below and proficient or advanced groups were the factors. The dependent variables were the four learning preferences (auditory, kinesthetic, visual and tactile).

Descriptive statistics were run (see Table 9), which revealed the means and standard deviations for each group. In the four learning styles preference areas for the basic or below basic group, the means ranged from 44.7 through 50.8. The highest was visual social studies students M= 50.8 SD= 7.3 and the lowest tactile math students M= 44.7, SD= 16.2. Higher means in each of the four categories represented students who preferred this learning style scoring basic or below basic on that portion of the PACT test. Visual learners, M= 50.8, SD= 7.3, performed better on the social studies portion of the PACT test, and kinesthetic, the ELA (M= 50.0, SD= 10.7) and science (M= 50.1, SD= 6.8) portions.

There were no subject areas in the tactile or auditory preference areas where there was a mean above 50. For the proficient or advanced groups, the means ranged from 39.2-64.1. The highest for this group was the proficient or advanced kinesthetic social studies group, M= 64.1, SD= 13.4 and the lowest auditory science, M= 39.2, SD= 13.9. The results dictated that kinesthetic students

performed the best on the social studies portion of the PACT test by receiving a proficient or advanced rating. Other areas with means of 50 or above were proficient or advanced auditory math M= 52.0, SD= 13.4; proficient or advanced auditory ELA M= 55.4, SD= 8.6; proficient or advanced visual science, M= 55.0, SD= 14.6; basic or below basic kinesthetic science M=50.1, SD= 6.8; proficient or advanced kinesthetic science, M= 51.7, SD= 8.3; proficient or advanced tactile math, M= 51.6, SD= 13.1; proficient or advanced tactile social studies, M= 58.6, SD= 10.6 and proficient or advanced tactile science, M= 55.8, SD= 11.0. All of students that fell into these preference categories did well on the perspective portions of the PACT test if they scored proficient or advanced. However, the only group this did not apply to was the basic or below basic kinesthetic science group.

Table 9

Means and standard deviations of groups on LSI

Group	LSI Area	Basic/Below Basic		Proficient/Advanced	
		Mean	SD	Mean	SD
Math (n=10)	Auditory	49.4	16.5	52.0	13.4
	Visual	47.9	11.7	44.1	11.9
	Kinesthetic	47.5	12.5	46.5	13.6
	Tactile	44.7	16.2	51.6	13.1
ELA (n=10)	Auditory	47.6	11.1	55.4	8.6
	Visual	47.6	8.3	43.5	6.3
	Kinesthetic	47.9	10.7	49.7	10.7
	Tactile	48.9	11.2	56.1	8.7

Table 9 (continued)

Soc. St. (n=9)	Auditory	45.9	8.0	46.1	11.7
	Visual	50.8	7.3	48.1	11.0
	Kinesthetic	48.6	6.6	64.1	13.4
	Tactile	47.3	10.4	58.6	10.6
Science (n=10)	Auditory	49.3	10.8	39.2	13.9
	Visual	45.3	6.7	55.0	14.6
	Kinesthetic	50.1	6.8	51.7	8.3
	Tactile	48.2	11.4	55.8	11.0

Statistical Results

A series of one-way analysis of variances were used to statistically evaluate the effect of learning preference (auditory, visual, kinesthetic, and tactile) and two groups (basic or below and proficient or advanced) for four subjects (science, social studies, math and ELA). The independent variable, performance on the PACT test, consisted of two groups, basic or below basic and proficient or advanced. The dependent variables, the preferred learning styles, were auditory, visual, kinesthetic and tactile. H1: Students who scored proficient or advanced and those who scored basic or below on the mathematics portion of the PACT test, differ significantly in the auditory, visual, tactile and kinesthetic areas as measured by the Learning Style Inventory.

The ANOVA was not significant for any math groups. $F(1, 18) = .150$, $p = .704$, kinesthetic $F(1, 18) = .029$, $p = .866$, visual $F(1, 18) = .581$, $p = .481$ and tactile $F(1, 18) = 1.095$, $p = .309$. The highest mean for the basic or below basic group, $M = 49.4$, $SD = 16.5$, was in the auditory preference category, with all other

categories within a range of 4.7. For the proficient or advanced group the highest mean was in the auditory preference area also, (M= 52.0, SD= 13.4) with all others within a range on 7.9.

H2: Students who score proficient or advanced and those who score basic or below on the English Language Arts portion of the PACT test, differ significantly in the auditory, visual, tactile and kinesthetic areas as measured by the Learning Style Inventory. On the ELA portion of the PACT test, the findings indicated that again that there were no significant groups. Auditory $F(1, 18) = 3.082$, $p = .095$, visual $F(1, 18) = 1.546$, $p = .23$ and tactile $F(1, 18) = 2.569$, $p = .126$ and kinesthetic $F(1, 18) = .141$, $p = .712$. The highest mean for the basic or below basic group, M= 48.9, SD= 11.2, was in the tactile preference category, with all other categories within a range of 1.3. For the proficient or advanced group, the highest mean was in the tactile preference area (M= 56.1, SD= 8.7) with all other categories within a range of 12.6.

H3: Students who scored proficient or advanced and those who scored basic or below on the science portion of the PACT test, differ significantly in the auditory, visual, tactile and kinesthetic areas as measured by the Learning Style Inventory. The same results, no significant groups, were rendered for science, auditory $F(1, 18) = 3.305$, $p = .086$, visual $F(1, 18) = 3.666$, $p = .072$, tactile $F(1, 18) = 2.309$, $p = .146$ and kinesthetic $F(1, 18) = .223$, $p = .642$. For the basic or below basic group the highest mean was the kinesthetic preference group, (M= 50.1, SD= 6.8) with all others within a range of 4.8. The proficient or advanced

group had the highest mean in the tactile preference area (M= 55.8, SD= 11.0) with all others falling within a range of 16.6.

H4: Students who scored proficient or advanced and those who scored basic or below on the Social Studies portion of the PACT test, differ significantly in the auditory, visual, tactile and kinesthetic areas as measured by the Learning Style Inventory. The findings indicated that basic or below basic students have one strong preference area in social studies. The highest mean, M= 50.8, SD= 7.3, was in the visual preference category, with all other categories within a range of 5.8. Social studies proficient or advanced tactile (M= 58.6, SD= 10.6) and kinesthetic (M= 64.1, SD= 13.4) groups had two of the highest means of any groups. Only one group was significant for social studies, kinesthetic $F(1, 14) = 9.368$, $p = .008$. The others were all non-significant auditory $F(1, 14) = .003$, $p = .960$, visual $F(1, 14) = .332$, $p = .574$ and tactile $F(1, 14) = 4.551$, $p = .051$. This significance shows that these students have a strong preference for kinesthetic methods of learning and testing, and this may have resulted in their positive performance on the PACT.

Correlation coefficients were computed among the four areas of the PACT and twenty-two areas of the LSI. Using the Bonferroni approach to control for Type I error across 26 correlations, a p-value of less than .005 was required for significance. Out of the 26 ancillary findings, only 15 were analyzed, since the researcher only wanted to focus on four of the learning style preference areas assessed on by the LSI. The four areas of the LSI were kinesthetic, tactile auditory and visual and the four PACT subject areas were science, social

studies, English language arts and math. The results of the correlational analyses in Table 10 show that 5 out of the 15 ancillary findings were statistically significant. The correlations of science and ELA with the preference areas rendered two significant correlations. For science and ELA, the ancillary findings with auditory and visual preferences were significant. Social studies had one significant ancillary finding with tactile preferences, while math had none. In general, the results suggested that students who prefer the learning preferences that were significant, may have done a little better on that portion of the test.

Table 10

Correlations among area on PACT test and learning styles (N = 76)

	Math	ELA	Science	Social Studies
Auditory	-.10	.49*	-.47*	-.08
Visual	-.06	-.48*	.51*	
Tactile	.37	.37	.40	.52*
Kinesthetic	.29	.29	.03	.43

* Correlation is significant at the 0.05 level (2-tailed)

These ancillary findings were computed in order to help the researcher identify which learning style preference areas have a significant effect on how students will perform on certain areas of the PACT. These findings may suggest that methods that are being utilized to teach students are not appropriate enough to render required scores on the PACT or the test itself may need to address the issues of the student's learning style preference in order for them to be successful.

CHAPTER V

DISCUSSION

Four hypotheses were analyzed in this study to determine if there were a correlation between learning style preferences and performance in four areas of the Palmetto Achievement Test. These hypotheses were developed from four variables on the Learning Style Inventory created by Price, Dunn and Dunn (Price, 2006). These variables included preferences in the areas of tactile, kinesthetic, visual and auditory. First, permission and approval was obtained from the Human Subjects Protection Review Committee at the University of Southern Mississippi to conduct this study. Permission was also requested from the district office and school principal via written letters, with return written approvals from both entities. Once the students were selected, a parental permission slip was required by those students to participate in the study. This form was accompanied by a letter to the parent or guardian explaining the nature and description of the study. Once all signed consents were returned, the researcher administered the LSI to students with the assistance of the guidance department in the school's cafeteria.

Once the instrument was completed and collected, they were mailed to Price Systems, Inc., for scoring purposes. Once the results were returned to the researcher, the group scores provided by Price Learning Systems, Inc. were analyzed and eight tables were developed to display the number of students in each group who scored 50 or above (see Tables 1,3,5 and 7) on the four areas

for each subject on the PACT test or 49 or below (see Tables 2,4,6 and 8) on the four learning style areas for each subject on the PACT test. The individual scores from the LSI and each student's performance on the ELA, mathematics, science or social studies portions of the PACT test were analyzed using a series of analysis of variances (ANOVA's). Descriptive statistics were calculated for each group's (basic or below basic and proficient or advanced) responses to the four learning style areas used in the four hypotheses. The analysis revealed that there were no extremely strong preference areas except for kinesthetic social studies students for the proficient or advanced group. This was the only group that was statistically significant.

Conclusions

Auditory Learning Preference

The results for this area indicated that students with this preference perform well on the ELA and math portions of the PACT test scoring proficient or advanced. The preference to learn through auditory stimulation may be better for students in this subject area due to the phonics that are involved with English language arts. The traditional theory of phonics was established in the early nineteenth century. According to Cooley (2003) up until the early nineties, phonics was the only way that a child was taught to read in a classroom setting. Phonics can be defined as the "association of letters or combinations of letters with their appropriate speech sounds. Phonics also includes the understanding of the principals that govern the use of letters in words" (Cooley, 2003). Auditory learners would benefit from teaching that involves phonetics because these

students learn by what they hear. Sounding out words it helps them to recognize words later on when they are reading a book. Auditory learners succeed when directions are read aloud, speeches are required, or information is presented and requested verbally. An auditory learner will often be strong in reading and language skills, and will most often learn well with reading instruction based on phonics skills (Maxey, 2008). There is not as much evidence that supports auditory learners doing as well in math. Some research suggested that this may occur if flash cards are involved with math facts or problems, which are considered drill and practice activities.

Visual Learning Preference

The results of this study indicated that students whose learning preference is visual performed well on only the science portion of the PACT test. This portion of the PACT test consists of many diagrams and charts. According to Family Education (2008) visual learners benefit from diagrams, charts, pictures, films, and written directions. Mayer & Anderson (1992) noted that the use of animated design draws potential research attention to visual learning preferences. Rieber and Kini (1995) extensively examined the effects of computer-animated graphics in physics instruction at different grade levels. He speculated that animated presentations provide clear and precise external illustrations to help students visualize those physical laws which involve changes in speed and the path of travel. There was also a mean of 50 or above for students who scored basic or below basic on the social studies of the PACT test. Since the mean was not 60, this result was not a really strong preference, which may explain why students

could have performed well or not meet state standard on this portion of the test. Graphic images have particular relevance to the social studies teacher's quest to cultivate problem solving skills and to build an informed citizenry (Duplass, 1996). Studies comparing the performance of students who were presented material with and without graphic displays provide convincing evidence that comprehension was improved for those who were taught with graphics (Arnold & Dwyer, 1975; Booher, 1975; Decker & Wheatly, 1982; Holliday, Brunner, & Donai, 1977; Rigney & Lutz, 1976). Charts, diagrams, tables, and graphs appear frequently as examples of instructional materials in the social studies content areas and range from simple groupings of candy bars for preschool students to sophisticated economic supply and demand curves (Duplass, 1996). According to Flemming (2008) diagramming, reading maps, essays (if you've studied using an outline), and showing a process are the best testing formats for visual learners, while listening and responding tests are the worst.

Kinesthetic Learning Preference

The study revealed that students with stronger preferences for kinesthetic methods of learning performed to state standard on the science and social studies portion on the PACT test. Kinesthetic learners benefit from taking laboratory classes, and perform better on tests that contain short definitions, fill-ins or multiple choice questions, instead of those tests that are long or contain essays. This finding may explain why students in this group performed better on these sections of the PACT test, since the majority of the questions are multiple choice for social studies and science portions. Much of the preparation for the

science portion takes place in the laboratory which may have some correlation to their performance on this section. According to Lamarche-Bisson (2002), the kinesthetic learner should be encouraged to use his or her need for movement productively. By representing what he or she has learned through an experiment in science, the kinesthetic learner could demonstrate what he or she has understood and retained. From the previous statement, it can be theorized that students may perform better on science tests because they received or learned the information in a way that was more suitable for them. There was not much research to support why kinesthetic students may have performed well on the social studies portion. Many theorists suggest that students all learn differently, and superior performance could have resulted from the instruction they received prior to testing involved many kinesthetic activities.

Tactile Learning Preference

Tactile learners need a hands-on approach to learn best. Tactile learners need to be actively exploring the physical world that surrounds them and bring actively engaged. Most research points out that those students who prefer tactile methods of learning do better in the areas of science. Tactile learners may have done especially well on the science portion because they need to have an experimental learning experience using their hands. They may enjoy any to creating models of working volcanoes, which are science based.

In this study however, students that scored 50 or above were in the areas of ELA and social studies also. For social studies, students tend to be taught lessons that are for those that have auditory preferences. This study and other

research suggest that supplementing the text with other resources and providing hands-on instruction enables the teacher to reach not only the auditory learners but also those who need more tactile, kinesthetic, or visual stimulation (Ragsdale & von Eschenbach, 1989). Again, even though there is not a plethora of research that supports the finding that tactile learners respond positively in the areas of social studies or ELA, it could have been that the instruction they received prior to testing involved many tactile activities.

For all four areas, students with means of 49 or below showed a possible weakness for these preference areas. Again this could be contributed to many factors, but most research supports the theory children learn and perform better on assessments when it is catered to their learning styles. Functioning effectively in any professional capacity, however, requires working well in all learning style modes. If instructors teach exclusively in a manner that favors their students' less preferred learning style modes, the students' discomfort level may be great enough to interfere with their learning (Felder, 1996). It is not enough to develop an awareness of one's learning style (for the student) and an awareness of the learning styles of a population of students (for the teacher), this awareness must be translated into a zone of comfort for learning and teaching strategies, respectively. This strategy work includes developing goals, defining hypotheses, deciding on tactic for problem solving, discovering methods, assessing performance and revising goals (Ouellette, 2000).

Limitations

This study on the learning style preferences of middle school students and their performance on the Palmetto Achievement Challenge Test could have been improved in a number of ways. The number of students participating in the study could have been increased. Originally the study was to consist of 96 participants, but many of the children did not return their consent forms, and thus could not participate in the study. This forced the researcher to use an already limited pool of students from which to select participants. The study was also limited to one grade level, which made it extremely difficult to find students that performed proficient or advanced on certain portions of the PACT, since the seventh grade students only took either the science or social studies portion this particular year the study was conducted. More participants in this study could have revealed even more differences in each of the hypothesized learning style areas. The groups could have been more defined to include just basic students, below basic students, proficient students and advanced students. This would have made the study more clearly defined and allow the researcher to see what students actually score depending on their learning style. Next, the groups that were identified could have been broken down even more so they could be clearly defined. These groups could have included a basic group, below basic group, proficient group and an advanced group.

Further, more than four areas of the Learning Style Inventory could have been hypothesized to see if they too had any effect on how students would perform on the PACT. The LSI is a comprehensive approach to the identification of how a student prefers to function, learn, concentrate and perform during educational

activities in the following areas also: environment (Sound, temperature, Light and Design); emotionality (Motivation, Responsibility, Persistence and the need for either Structure or Flexibility); sociological needs (Learning Alone, With Peers, or With Adults); and physical needs (Time of Day, Intake and Mobility) (Price, 2006). Additional preference assessments could have helped the researcher identify the effects of social and developmental issues that may have influenced performance on the PACT test. The issue of matching student learning style to teacher learning style could have also been addressed. To reduce teacher-student style conflicts, some researchers in the area of learning styles advocate teaching and learning styles be matched (Griggs & Dunn, 1984; Smith & Renzulli, 1984; Charkins, O'Toole, & Wetzel, 1985).

The ethnicity and socio-economic status of students are often associated with how they prefer to learn. Ethnicity-refers to groups whose members share a cultural heritage from one generation to another; normally defined on the basis of Race Learning-a relatively permanent change in behavior and/or mental associations due to experience (Ormrod, 1999). Several researchers suggest that ethnicity may play a major role in learning styles. According to Nace and Kathy (1993):

> More African American students were field independent learners, and more Caucasian students were field dependent learners. Field independent learners more often have short attention spans, are easily distracted, do best on verbal tasks, prefer cooperative learning, are very colorful in speech, highly creative in telling stories and appreciate

> information that has human content. Field dependent learners, on the other hand, have long attention spans, are not easily distracted, do best on analytical tasks, prefer competitive learning situations, are very formal in speech, not very creative in telling stories and appreciate information that is impersonal. Family structure/parents play important roles in a student's learning (p. 450)

Many times, these family structures may be the basis for a student's success or failure. The characteristics of African and Caucasian families were described by DuPree (1993):

> Many African American Families consist of single-parents where there is very little time to spend with children as they complete school work. Many of these families are also undereducated and may not understand or value the importance education. African-American families may also be financially limited and have no extra money to spend on supplemental educational material (i.e. books, computers). Caucasian -American families usually consist of two parents which provides for a substantial amount of time to spend with children as they complete school work. They tend to be educated, understanding and valuing the importance education. They may also be more financially secure, which in turn provides more money to spend on supplemental educational materials (pp. 8-9).

According to Griggs and Dunn (1995) demographic variables other than gender and ethnicity that impact on learning style may not be isolated in studies. These

variables include socioeconomic class, geographical region, primary language, religion, family structure, and number of generations in the U.S. In this study, none of previous mentioned variables were addresses and therefore serve as limitations.

Recommendations

A student's learning style reflects the manner in which he or she assimilates, processes, and recalls information (Whittington & Raven, 1995). Instructors must recognize learning styles as a significant source of diversity in the classroom learning and performance. This diversity underscores the need for educators to incorporate a variety of teaching methods, curriculum materials, and assessment techniques to foster and support the process of learning (Torres & Cano, 1994). Various means of characterizing learning combination with opportunities apparent from the existing research, suggest the need to further explore the relationship between students' preferred way of learning and their achievement. As any good teacher knows, there is no one-size-fits-all approach to either teaching or learning. In fact, we now have a solid body of research about cognition and learning styles that provides ample confirmation of this. Any good teacher also knows that proper assessment of learning is both complex and multifaceted. Tests particularly paper and pencil tests that are standardized are only one type of assessment. The teacher's role in addressing the learning styles of students is not only to accommodate when possible, but also to teach students how to acquire a repertoire of learning styles so that they are able to adapt to a multitude of learning situations (Logan, 2002).

If students are aware of their learning styles, they are more likely to adapt to situations or perform better on tests for these areas if there is accommodation to their styles. Knowing about learning styles should not be the only prescription to helping educators address the many issues faced with in educating children and preparing them for standardized tests. The findings of this study could encourage many states and the federal government to not only look at addressing teaching methods inside of the classroom, but also to critique and review the test that are administered to students to support accountability. Teachers could support success by implementing strategies to accommodate different learning styles. This action in turn may motivate students to learn information that is presented on state mandated accountability tests. Students may be more likely to retain the information that is taught and express their understanding of the information when presented with these tests. Educators being self-reflective and explicit about the role of learning styles can make teaching more rewarding and enhance the learning of all students at the same time (McKeachie, 1995). For students, it is important that educators always strive to help their full potential in order to experience success.

Future Research

The focus of this study was learning style preferences and student performance on the Palmetto Achievement Challenge Test. More research should be conducted to support the significant findings of this study. Some of this future research could entail schools identifying the learning styles of students not only for identification purposes, but for use in teachers, schools and districts

designing curriculums to address the needs of all students. Many districts now require teachers to provide evidence in lessons that there is specific targeted instruction matched to specific students identifiable by names to address all academic needs. This evidence that they are looking for many times is associated with tests scores and not any other descriptive characteristic of the child. A student's learning style should be one of the tools that these teachers are using to address this issue, because along with other information, this forms a powerful combatant against student failures in education. This research may start in the public schools, but even take flight in the post secondary sector. Teacher preparation programs are where educators can possibly have the most impact by developing the knowledge, skills and dispositions to accommodate all students' developmental needs and abilities .

Future research should be conducted to look at all the areas identified by the LSI to see if there are any more ancillary findings that are significant in student preferences and performance on state mandated test. These findings could give more support to providing educators with even more techniques to address academic deficiencies of all students. Schools that are identified as "failing" schools could have research based information to implement training programs for teachers and support programs for students if these findings are significant. There is a plethora of research pointing towards classroom instruction being driven by student learning preferences, but a small amount correlating preferences to performance on state mandated tests. With this in mind, this

study could be replicated with the areas discussed in my limitations section addressed to support this drive.

APPENDIX A

The University of Southern Mississippi
Institutional Review Board
118 College Drive #5147
Hattiesburg, MS 39406-0001
Tel: 601.266.6820
Fax: 601.266.5509
www.usm.edu/irb

HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **27051501**
PROJECT TITLE: **The Relationship Between Learning Sytles and Student Performance on the Palmetto Achievement Challenge Test In a Low Performing, Low Socioeconomic-Status School**
PROPOSED PROJECT DATES: **04/20/07 to 05/01/08**
PROJECT TYPE: **Dissertation or Thesis**
PRINCIPAL INVESTIGATORS: **Joseph L. Williams**
COLLEGE/DIVISION: **College of Education & Psychology**
DEPARTMENT: **Educational Leadership & Research**
FUNDING AGENCY: **N/A**
HSPRC COMMITTEE ACTION: **Expedited Review Approval**
PERIOD OF APPROVAL: **05/15/07 to 05/14/08**

Lawrence A. Hosman
Lawrence A. Hosman, Ph.D.
HSPRC Chair

05-15-07
Date

APPENDIX B

April 24, 2008

Ms. Carol Bartlett-Beckmann
Principal
Alice Birney Middle School
7750 Pinehurst Street
North Charleston, SC 29420

Dear Mrs. Bartlett-Beckmann:

My name is Mr. Joseph Williams, and I am currently a student enrolled in the Doctoral Program for Educational Leadership at the University of Southern Mississippi. I am writing this letter to you requesting that you please allow me to conduct a study pertaining to the PACT test which is given to students in your school or constituent district. The instrument that these students will be administered was developed by Dunn and Dunn, two leading researchers on learning styles of middle grade students.

I would like to reassure you that no risks, inconveniences, or discomforts will result from your students participating in this study. I would also like to inform you that the information that these children provide will not be linked to them in any of the findings that may result from this study, and that all personal information is strictly confidential. I would like to emphasize that this study is not being performed by the state, but by me personally to fulfill certain degree requirements.

I want you to know that your assistance in this matter is greatly appreciated and that this project will hopefully help me and other educators better understand how to help children be more successful. Any new information that develops during the project will be provided if that information may affect your willingness to continue participation in the project. Questions concerning the research at any time during or after the project should be directed to me at any one of the contact references provided above.

Parental permission will also be requested once the study is approved by you. Information concerning the child's previous and future PACT scores will also be requested from the Guidance Department, so please take this into consideration when making your decision. If you grant your permission for the students in your school to participate, please return a letter on district letterhead to me via email or postal stating this. Again I would like to thank you in advance for assisting me in creating a brighter future for our children, and I look forward to working with you.

Sincerely,

Mr. Joseph L. Williams

Prospective Ph.D. Candidate

180 SWEET ALYSSUM DRIVE3• LADSON/SC • 29456
PHONE: (843)819-1104• EMAL: NAGCHAMPA73@AOL.COM

APPENDIX C

April 24, 2008

Dr, Janet Rose-Baele
Office of Assessment and Accountability
Charleston County School District
75 Calhoun Street
Charleston, SC 29401

Dear Dr. Rose-Baele:

My name is Mr. Joseph Williams, and I am currently a student enrolled in the Doctoral Program for Educational Leadership at the University of Southern Mississippi. I am writing this letter to you requesting that you please allow me to conduct a study pertaining to the PACT test which is given to students in your school or constituent district. The instrument that these students will be administered was developed by Dunn and Dunn, two leading researchers on learning styles of middle grade students.

I would like to reassure you that no risks, inconveniences, or discomforts will result from your students participating in this study. I would also like to inform you that the information that these children provide will not be linked to them in any of the findings that may result from this study, and that all personal information is strictly confidential. I would like to emphasize that this study is not being performed by the state, but by me personally to fulfill certain degree requirements.

I want you to know that your assistance in this matter is greatly appreciated and that this project will hopefully help me and other educators better understand how to help children be more successful. Any new information that develops during the project will be provided if that information may affect your willingness to continue participation in the project. Questions concerning the research at any time during or after the project should be directed to me at any one of the contact references provided above.

Parental permission will also be requested once the study is approved by you. Information concerning the child's previous and future PACT scores will also be requested from the various Guidance Departments, so please take this into consideration when making your decision. If you grant your permission for the students in your school or constituent district to participate, please return a letter on district letterhead to me via email or postal stating this. Again I would like to thank you in advance for assisting me in creating a brighter future for our children, and I look forward to working with you.

Sincerely,

Mr. Joseph L. Williams

Prospective Ph.D. Candidate

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PHONE: (843)819-1104• EMAL: NAGCHAMPA73@AOL.COM

APPENDIX D

UNIVERSITY OF SOUTHERN MISSISSIPPI
AUTHORIZATION TO PARTICIPATE IN RESEARCH PROJECT
(Short Form)

Student's Name _____

Consent is hereby given to participate in the research project entitled ***Student Learning Styles and Performance on the PACT Test***. All procedures and/or investigations to be followed and their purpose, including any experimental procedures will be explained by **Joseph Williams**. Information will be given about all benefits, risks, inconveniences, or discomforts that might be expected.

The opportunity to ask questions regarding the research and procedures will be given. Participation in the project is completely voluntary and subjects may withdraw at any time without penalty, prejudice, or loss of benefits. All personal information is strictly confidential and no names will be disclosed. Any new information that develops during the project will be provided if that information may affect the willingness to continue participation in the project.

Questions concerning the research, at any time during or after the project, should be directed to **Joseph Williams** at **(843)-819-1104**. This project and this consent form have been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the Chairman of the Institutional Review Board, University of Southern Mississippi, Box 5147, Hattiesburg, MS 39406, (601)-266-6820.

A copy of this form will be given to the participant.

Subject is _____ years old.

_____ _____

Minor Subject's Signature Signifying Assent

Parent or Guardian's Signature

_____

Date

APPENDIX E

April 24, 2008

Dear Parent(s)/Guardian:

My name is Mr. Joseph Williams, and I am currently a student enrolled in the Doctoral Program for Educational Leadership at the University of Southern Mississippi. I am writing this letter to you requesting that you please allow your child to participate in a study that they were randomly selected for pertaining to their particular learning style and how they perform on the PACT test administered to them in the spring. The instrument that your child will be completing, the Learning Style Instrument (LSI), was developed by researchers who have studied learning style of students in middle grades.

I would like to extend a high level of comfort to you by letting you know that your child was randomly selected by the school, and by no means were any distinguishing characteristics looked at in this process, with the exception of prior performance on the PACT test. I would also like to inform you that the information that your child provides will not be linked to them in any of the findings that may occur as a result of the study. This study is not being performed by the district, but by me personally to fulfill certain degree requirements. There are a total of 90 subjects participating in this study. Your child will be identified by a identification number that will be assigned to them by the researcher and their names will not be used on the instrument or in the final dissertation. All information will be shredded once the study is complete.

I want you to know that your assistance in this matter is greatly appreciated and that the work which is being done will ultimately help me and other educators better understand how to help your child be successful. Any new information that develops during the project will be provided if that information may affect the willingness to continue participation in the project. Questions concerning the research at any time during or after the project should be directed to me at any one of the contact references provided below.

Attached you will find a consent/assent form that has been approved by the Human Subjects Protection Review Committee. If your child is willing to participate, and you grant your permission, please return the signed consent/assent form in the pre-stamped envelope provided. Again I would like to thank you and your child in advance for assisting in creating a brighter future for them.

Sincerely,

Joseph Williams

Prospective Ph.D. Candidate

180 SWEET ALYSSUM DRIVE• LADSON/SC • 29456

PHONE: (843)819-1104• EMAL: NAGCHAMPA73@AOL.COM

APPENDIX F

Survey Completion Directions

Oral Presentation

First and foremost, I would like to thank each of you for volunteering to participate in this study that I am conducting on student learning styles. Your help is greatly appreciated. Before you begin, I would like to remind you that there is no right or wrong answer, only a truthful one. Please listen as I read the directions for completing this survey.

1. Read each statement carefully.
2. Decide to what extent you would agree or disagree with that statement if you had something new or difficult to learn.
3. Mark (SD) if you strongly disagree, or (D), disagree, or (U), uncertain, or (A), agree, (SA), strongly agree as the response best describes how you feel most of the time.
4. Note that some of the questions are repeated to help make the inventory results more reliable. Answer the repeated questions the same as you did the first time you read the question
5. Give your immediate or first reaction to each question.
6. Please answer all questions with a no. 2 pencil.

When you are done, please raise your hand and I will come and collect your surveys.

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