

READING COMPREHENSION, LEARNING STYLES, AND SEVENTH GRADE
STUDENTS

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Reading Comprehension, Learning Styles, and Seventh Grade Students

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ABSTRACT

Judy Williams. READING COMPREHENSION, LEARNING STYLES, AND SEVENTH GRADE STUDENTS. (Under the direction of Dr. Karen Parker) School of Education, February 2010.

Reading is a basic life skill. Unfortunately, in 2007, only 29% of all eighth graders were able to comprehend at or above a proficient reading comprehension level. Sensory learning styles (kinesthetic, tactile, auditory, and visual) affect the way that students prefer to learn and the areas in which they will have difficulty learning. This study examined sensory learning styles as one possible factor affecting seventh grade students' reading comprehension level. The purpose of this study was to see if a relationship exists between any sensory learning style and reading comprehension levels. The subjects for this study were seventh graders from two suburban junior high schools in Utah. The instruments for this study were The Kaleidoscope Profile and the Scholastic Reading Inventory (SRI). The data were analyzed using the Chi Square test for Independence, ANOVA, and post hoc tests. When comparing sensory learning styles and reading comprehension, the results indicated that there was a relationship between kinesthetic, auditory, and visual learning styles and reading comprehension levels. When comparing the learning styles of struggling readers and on-grade-level readers, the results indicated that there was a significantly different distribution of kinesthetic, auditory, and visual learning styles. Finally, when comparing School A and School B, there was a significantly different distribution for all learning styles.

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CHAPTER ONE: INTRODUCTION TO THE STUDY

In *Becoming a Nation of Readers* (1985), Anderson, R., Hiebert, Scott, and Wilkinson stated that the basic life skill of reading is a cornerstone for success in both school and life. They further state that without the ability to read well, people will lose opportunities for personal fulfillment and job successes. Without the ability to read, a person might not be able to cure cancer, invent the next technological breakthrough, or fix a complex piece of machinery. People who cannot read can function in the literate world, but they must have a strong memory or use trial and error. How does a person purchase groceries if the picture on the package is not what is in the package (such as a can of Crisco with a picture of fried chicken and a carton of milk with a picture of a cow)? How does a person get and hold a job when he or she cannot read the application and training materials? How does a person understand history or current events when his or her only source of information is television and radio news media or Hollywood movies? How does a person read to his or her child? Statistics show that lower reading abilities lead to students dropping out of school, having lower paying jobs, and a creating a greater propensity to continue the cycle of illiteracy in the next generation (Alliance for Excellent Education, 2007; Daggett, 2003; Kutner, Greenberg, Jin, Boyle, Hsu, & Dunleavy, 2007).

While the level of reading ability a person needs to complete all of the tasks above is different for each task, Williamson states that the average textual demands of an effective functioning adult falls in a Lexile range (a scale for comparing text difficulty to reading ability) between 1180L and 1260L, which is at or above a high school Lexile range (2004). Getting a drivers license, applying for a student loan, and even filling out income tax forms are some areas where people with lower reading abilities will struggle. Utah's *Motorcycle*

Operator Manual has an average Lexile of 1330L, the *Texas Drivers Handbook* has an average Lexile of 1825L, and the *Virginia Driver's Manual* has an average Lexile of 1330L (MetaMetrics, n.d.; Texas Department of Public Safety, 2004; Utah Department of Public Safety, 2007; Virginia Department of Motor Vehicles, 2008). An application for a student loan has a Lexile of 1270L, the Federal tax form W-4 has a Lexile of 1260L, and the 1040EZ instructions have an average Lexile of 1330L (Daggett & Hasselbring, 2007; Department of the Treasury Internal Revenue Services, 2008; MetaMetrics, n.d.). All of these examples have Lexile scores that fall above the expected range that a student would have in 10th grade. Table 1.1 shows the expected Lexile range by grade level.

Table 1.1: Lexile Range by Grade Level

Grade	Lexile Range	Median
First	100-400	250
Second	300-600	450
Third	500-800	650
Fourth	600-900	750
Fifth	700-1000	850
Sixth	800-1050	925
Seventh	850-1100	975
Eighth	900-1150	1025
Ninth	1000-1200	1100
Tenth	1025-1250	1138
Eleventh	1050-1300	1175

(MetaMetrics, 2008c)

However, according to *The Nation's Report Card: Reading 2007*, only 29% of all eighth graders were able to comprehend at or above a proficient level, while 43% read at a basic level, and 27% were only able to comprehend at a below-basic level (Lee, Grigg, & Donahue, 2007). This report means that over 70 % of the students in eighth grade in 2007 were in danger of having low-paying jobs and of struggling to comprehend basic, daily, work-related, and citizenship-related items. Unfortunately, many of these students will not receive reading instruction for the rest of their educational careers. According to Daggett and Hasselbring (2007), only 58 reading coaches and 987 remedial reading teachers worked in over 16,000 school districts in the 2005-2006 school year. Daggett and Hasselbring add that low reading ability can become a social stigma that breeds indifference to learning and undermines self-image and self-confidence throughout life. In fact, the Alliance for Excellent Education states that students with below-level reading abilities are twice as likely to drop out of school as those who are reading on or above-grade-level (2007).

In addition to being more likely to drop out of school, students with lower reading abilities are most likely to become adults who have low-paying jobs (Kutner et al., 2007). Between 17 to 18% of the adults who scored on the below-basic level on the assessment were earning below \$300 a week compared to three to six percent of adults who scored proficient. In comparison, 12 to 14% of adults who scored proficient were earning over \$1,950 a week compared to only two to three percent of those who scored below-basic. The average Lexile range needed to hold a job, join the military, or even be an informed citizen is between 1180L and 1260L (Williamson, 2004). A service worker's everyday Lexile average requirement is around 875L, a sales representative's is 1150L, a teacher's is 1350L, and a scientist's is 1490L (Daggett, 2003; MetaMetrics, 2006). Kutner et al. (2007) also stated that

34 to 35% of the people with below-basic reading abilities felt that their reading abilities hurt their job opportunities. Just a simple online application for a major company requires that an applicant be able to read and agree to conditions in a text with a Lexile of 1210L, while an online explanation of benefits for the same company requires a Lexile of 1230L (MetaMetrics, n.d.; Walmart, n.d.).

In addition to being in danger of dropping out and having lower paying jobs as adults, students with lower reading abilities who continue to struggle are less likely to read to their own children (Kutner et al., 2007). Not reading to a child begins a repeat of the cycle of illiteracy. Only 27% of the adults who scored at the below-basic level in the National Assessment of Adult Literacy study reported that they read five or more times a week to their children who are under eight years old as compared with 36% of the adults who scored at a basic level. Additionally, 41% of those reading at a below-basic level reported that they had not read to their children at all in the previous week as compared with 25% of the adults who read at the basic level. Many studies have shown that reading to young children is a predictor of those children's future reading success (Colker, n.d.; Community Pediatric Review, 2003; Cullinan & Bagert, 1996). In fact, Cullinan and Bagert (1996) state, "There is no more important activity for preparing your child to succeed as a reader than reading aloud together."

What can educators do to help struggling readers? Are there some common variables among students with reading comprehension problems? Could sensory learning styles (kinesthetic, tactile, auditory, or visual) be a variable? According to Haggart (2003), students with different sensory learning styles have distinct ways they prefer to learn and areas where they will have difficulty learning. The bulleted statements below define some of those areas:

- Kinesthetic learners tend to like to read how-to books and action-oriented books, but they will have trouble sitting still or listening for more than four minutes.
- Tactile learners tend to like to read historical novels or biographies, but they will have trouble succeeding without lots of sensory stimuli.
- Auditory learners tend to like to read plays and dialogues, but they will have trouble reading silently and with speed when not allowed to vocalize.
- Visual learners tend to like to read for pleasure, but they will have trouble working in an environment with noise and distractions.

If specific sensory learning styles are a variable in struggling secondary readers, then educators could create lesson plans that use the strengths of those styles to build comprehension skills. This study examined sensory learning styles as one possible related factor affecting seventh grade students who are reading at a fourth grade level or below.

Statement of the Problem

Among seventh grade students in two suburban schools in Utah, what is the relationship between having a specific sensory learning style, as determined by The Kaleidoscope Profile, and having below-grade-level reading comprehension, as determined by The Scholastic Reading Inventory (SRI)? If this study can show a relationship between sensory learning styles and below-grade-level reading comprehension, then reading teachers could create reading strategies that address specific sensory learning styles to help support these learners as they develop their reading abilities. They could develop programs that include specific learning style strategies in the early elementary grades to help other students before they become struggling readers.

Statement of the Hypotheses

This study explored the possibility that there is a relationship between sensory learning styles and reading ability, so this researcher posed the following null hypotheses:

Null Hypothesis 1: There will not be a significant relationship between Lexile scores and sensory learning styles.

Null Hypothesis 2: When comparing struggling readers and on-grade-level readers, there will not be a significant difference in the distribution of specific sensory learning styles.

Null Hypothesis 3: When comparing School A and School B, there will not be a significant difference in the distribution of specific sensory learning styles.

Methodology

This study is a quantitative comparison of variables to determine the existence of a possible relationship between sensory learning styles and reading comprehension ability. This study includes data gathered from the assessment scores of students enrolled in the two sample schools during the 2007-2008 school year. The information stated below provides a description of the subjects, instruments, and procedures that this study used.

Subjects. This researcher selected the subjects from two schools (School A and School B) in a large suburban school district in Utah. The two schools have similar demographics, and both have a significant number of students who are reading below-grade-level (Davis School District, 2006). All of the seventh grade students from School A and all of the seventh grade students enrolled in two special reading programs (Read 180 and Special Education Reading) in School B were possible subjects. All of School A's seventh graders and all of School B's seventh grade reading program students were given the SRI test near the beginning of the school year. The English teachers in each of the respective classes

administered the SRI tests. These SRI scores provided Lexile scores used to determine reading comprehension levels. All subjects in attendance on testing day took The Kaleidoscope Profile and received information on their learning styles. Each student took The Kaleidoscope Profile in the computer lab during his or her regular English class, and the English teacher served as the proctor. The English teachers gave all of the students who had taken both tests parental permission letters and asked them to return them by a specific date. After the deadline, the researcher obtained phone numbers for the students who did not return their permission slips and obtained verbal permission from additional subjects' parents. After this researcher made reasonable attempts to reach all possible subjects, only those who had taken both assessments and had parental permission were included as subjects in the study. The next section describes some of the demographics of each school.

School A. School A is a junior high school with students in grades seven through nine (Davis School District, 2008). The students who attend this school come from six elementary schools within the district. During the 2007-2008 school year, School A had an enrollment of between 950 and 1000 students in all three grades with a seventh grade population of about 344 (Davis School District, 2006). The percent of the population eligible for free or reduced lunch was 32%, and six percent were students in the initial levels of English Language Learners (ELL). The school had a 12% mobility rate, which means that 12% of the students transferred in or out of the school during the school year. In the seventh grade, 26% of the 344 students were reading below-grade-level according to the end-of-year testing. The school failed to make Adequate Yearly Progress (AYP) goals in the 2007-2008 school year. AYP is met when all student subgroups, including economically disadvantaged students, all racial and ethnic groups, students with disabilities, and students with limited

English proficiency, meet the required level of performance in reading and math (Borkowski & Sneed, 2006). Chapter Three contains more demographic information for School A.

School B. School B is a junior high school with students in grades seven through nine (Davis School District, 2008). The students who attend this school come from seven elementary schools within the district. During the 2007-2008 school year, School B had an enrollment of between 925 and 975 students in all three grades with a seventh grade population of about 321 (Davis School District, 2006). The percent of the population eligible for free or reduced lunch was 50%, and 14% were students in the initial levels of ELL. The school had a 16% mobility rate. Forty-two percent of the 321 seventh grade students were reading below-grade-level according to the end-of-year testing. The school failed to make AYP goals in the 2007-2008 school year. Chapter Three contains more information on the demographics for School B.

Instruments. This research uses The Kaleidoscope Profile to measure the students' sensory learning styles and The Scholastic Reading Inventory (SRI) to measure the students' Lexile levels. The Mental Measurements Yearbook Volume Nine, which is an online database published by the Buros Institute that gives information about and reviews of tests and assessments, does not contain an evaluation of either of these two instruments (Liberty University, 2009). This section will explain The Kaleidoscope Profile, SRI, and Lexile.

The Kaleidoscope Profile. This research used The Kaleidoscope Profile, developed by William Haggart, to measure the students' preferred modality: kinesthetic, tactile, auditory, or visual. The Kaleidoscope Profile uses lists of constructed phrases that its creators matched with students' grade levels and information about classroom specifics to target different sensory learning style characteristics (Haggart, 1998). These phrases include

the use of visual, kinesthetic, and auditory verbs. The Kaleidoscope Profile comes in print and online format in four versions: Student Grades Three to Six, Student Grades Seven to Twelve, Educator, and Workplace. This research used the Student Grades Seven to Twelve online version. In the online format, students click on colorful tiles with short phrases that have the most meaning for them in relation to one of four incomplete phrases: “I enjoy school when,” “School activities I enjoy,” “I value,” and “School is important because.” Once selected, the tiles move into another column (Haggart, 1997). If a student changes his or her mind, he or she can deselect a tile to put it back in the main column and select a different tile. Once the students indicate that they are satisfied with their choices, the computer tallies the students’ selections and provides results including their preferred learning and working styles and helpful hints to encourage the students to improve their learning environment. The Kaleidoscope Profile tests for sensory styles including kinesthetic, auditory, visual, or tactile preferences; perceptual and organizational styles including abstract-global, abstract-sequential, concrete-global, and concrete-sequential preferences; and personality styles including intuitive-feeling, intuitive-thinking, sensing-judging, and sensing-perceiving preferences (Haggart, 1998). This research focused on the sensory style preferences.

The Kaleidoscope Profile was validated in two series of field tests that included over 2,000 students chosen from a cross section of urban, rural, and inner city schools from across the US (Haggart, 1998). Haggart’s research showed The Kaleidoscope Profile had a predictive validity between .78 and .88. His research also showed two types of external consistency when he compared The Kaleidoscope Profile results with results from other tests and with the expected numbers of types of learners in the population. Chapter Three contains

further discussion of The Kaleidoscope Profile.

Scholastic Reading Inventory. This study used the computer version of the Scholastic Reading Inventory (SRI) to measure reading comprehension levels because both schools were already using this assessment to help place students into reading programs for the 2006-2007 school year. The students took the Scholastic Reading Inventory (SRI) to determine a Lexile comprehension score.

While the SRI began as a targeted-level pencil-and-paper test, it is now available in a computer-adaptive test format as well. A computer-adaptive test format is one that adjusts the difficulty level of each question based on the student's response to the previous question (Olson, 2005). An incorrect answer triggers an easier question and a correct question triggers a harder question, which allows the test to provide fast, accurate results. Both the pencil-paper version and the computer-adaptive version of the SRI provide a Lexile score, a percentile rank, a stanine score, and a normal curve equivalent (NCE) (Scholastic, 2001). Both versions measure how well students comprehend literature and expository texts of varying difficulty levels (Smith, M., 2004). The computer-adaptive test takes approximately 20 minutes, and one proctor can administer the test to a group in the computer lab. The computer-adaptive test provides a Lexile score immediately upon completion.

Each SRI test item consists of a passage and a response to that passage, such as a phrase with four distracters (Lennon & Burdick, 2004). Each of the approximately 4,800 items are based on authentic passages taken from textbooks, literature, and periodicals that can measure a student's reading comprehension between 100L and 1500L (Knutson, 2005; Scholastic, n.d.a). Because each of the distracters for each item could fit in the blank if considered separately from the passage, students must understand the passage to respond

correctly. In the computer-adaptive version, the student starts out with test questions on the level that the administrator has chosen based on previous testing data, grade level, or other data (Scholastic, n.d.a). There are four levels: far-below-grade-level, below-grade-level, on-grade-level, or above-grade-level (Scholastic, 2001). The computer then changes the difficulty level of the next question based on the answer to the previous question. When the computer program has determined which level of items the student can answer with seventy-five percent accuracy, that level becomes the student's Lexile score.

Scholastic normed the SRI test using a group of 512,224 students (Scholastic, 2001). SRI researchers used 19,000 fourth through ninth grade students to check for gender, race, and ethnic differences. As part of that process, Scholastic created a bank of test questions and created data points for each question. Lennon and Burdick (2004) state that each item in the test bank includes information on the following data point questions:

- What was the expected difficulty level of the item (theoretical difficulty: at what Lexile level did Scholastic think that 70% or more of the subjects would answer correctly)?
- How difficult was the item when administered to students (observed difficulty: at what Lexile level did 70% or more of the subjects would answer correctly)?
- What percent of students chose the correct answer?
- What was the grade level of the students assigned the specific question?
- How many students responded to the question?
- How many students chose each of the four distracters?

Tables 1.2a and 1.2b show an example of an SRI reading assessment question and the set of data that exists for that question.

Table 1.2a: Example of an SRI Reading Assessment Question

<p>“The First Men in the Moon,” by H. G. Wells</p> <p>In addition to my belief in my powers as a business man, I had always in those days had an idea that I was equal to writing a very good play. It is not, I believe, a very uncommon persuasion. I knew there is nothing a man can do outside legitimate business transactions that has such opulent possibilities, and very probably that biased my opinion. I had, indeed, got into the habit of regarding this unwritten drama as a convenient little reserve put by for a rainy day. That rainy day had come.</p> <p>I wanted to be a(n) _____.</p> <p>A. author</p> <p>B. doctor</p> <p>C. actor</p> <p>D. singer</p>

Table 1.2b: Item Statistics for SRI Reading Assessment Question Example

<u>Item Statistics for “The First Men in the Moon,” by H. G. Wells</u>	
Theoretical Calibration 1110L	N 18,808
Observed Difficulty 1134L	Responses Distractor A 14,272
Point biserial 0.43	Responses Distractor B 703
P-Value 0.76	Responses Distractor C 3403
Grade Administered 8	Responses Distractor D 430

(Scholastic, 2001)

Two independent research studies (Knutson, 2005, 2007) have also shown that the SRI has test-retest validity and concurrent validity. Knutson compared SRI scores to scores from the Florida Comprehensive Assessment Test, Sunshine State Standards (FCAT-SSS) Reading to see if the SRI could be used to predict FCAT-SSS Reading scores to help educators plan for instruction, identify struggling readers, gauge effectiveness of the curriculum, demonstrate accountability, set growth goals, and forecast state results (2005). This study involved all students attending grades three to ten in the School District of Palm Beach County, Florida in the 2001-2002 school year. All 76,427 students took the test in the fall of 2001 and again in the spring of 2002, and the SRI test-retest correlations ranged from .81 to .85. The criterion-related validity of the SRI scores compared both the fall and spring SRI scores to the spring 2002 FCAT-SSS Reading score. The fall-to-spring correlations for grades three to ten ranged between .71 and .76. The spring-to-spring correlations ranged from .75 to .82. This study found that the SRI scores statistically correlated to end-of-year FCAT-SSS Reading results, and low or high scores on the SRI in the fall predict low or high scores on the FCAT-SSS Reading in the spring. In this study, correlations were significant at $p < .0001$.

Another study (Knutson, 2007) that showed the SRI's test-retest and concurrent validity compared the SRI with the California Standards Test (CST) English-Language Arts. This study was conducted to determine if Lexile scores from the SRI could predict CST English Language Arts scores to enable teachers to identify students who were in danger of failing the CST early enough to provide remediation. The subjects included 3,465 students in the San Rafael City Schools during the 2006-2007 school year. The students took the SRI test three times: fall 2006, winter 2006, and spring 2007. The test-retest correlations between

the fall and winter SRI scores ranged from .80 to .95, and the test-retest correlations between the fall and spring SRI scores ranged from .76 to .94. The criterion-related validity compared the fall, winter, and spring SRI scores to the spring 2007 CST English Language Arts scale score. The fall-to-spring correlations ranged from .60 to .87, the winter-to-spring correlations ranged from .72 to .88, and the spring-to-spring correlations ranged between .70 and .88. In this study, correlations were significant at $p < .5$. This study found that the SRI statistically correlates to end-of-year CST English Language Arts results. Chapters Two and Three contain further discussion of the SRI.

Lexile. The Lexile Framework[®] for Reading is a scientific measurement system developed by MetaMetrics to measure reading ability and text difficulty (Smith, M., 2004). This framework puts readers and text on the same Lexile scale by assuming that researchers can order readers by reading ability and can order text by difficulty. Then, the difference in scaled scores can predict the level of comprehension a reader will have with the text. MetaMetrics bases Lexile measures on the relationship between the semantic difficulty and syntactic complexity of texts. There are special rules for measuring picture books and nonfiction books with less than five hundred words that authors often design for emergent readers. MetaMetrics based Lexile measures for readers on text the reader is able to comprehend with 75% accuracy. If a person is reading within his or her Lexile range, 50L above to 100L below his or her Lexile score, that person can expect to comprehend the text with at least 75% accuracy. Chapter Two contains further discussion of the Lexile Framework and Lexile scores.

Procedures

The researcher obtained permission to complete this research from Liberty

University, the school district, and both schools. Parental permission letters (Appendix A) were sent home with all of the seventh grade students in School A and the students in the Special Education Reading program and the Read 180 program in School B. The permission slips asked for a parent or guardian to sign his or her name and to check a box either granting or withholding permission. After the deadline for returning permission slips, the researcher obtained verbal permission by contacting the parents of any student who did not bring back a form to obtain permission. All students in both school groups had already taken the SRI test at the beginning of the year as part of their English and reading placement in the school. All students in attendance on the assigned day for The Kaleidoscope Profile took that assessment as part of their English class. The English teachers administered The Kaleidoscope Profile during their regular class periods. As the students took both the SRI and Kaleidoscope Profile, they used their district ID numbers to identify themselves. After the researcher had collected all data, she erased the data for the students whose parents had not given permission for them to be in the study from the research database. Next, the researcher assigned a new research number to each remaining subject. Finally, this researcher erased the district ID numbers from the research database.

Terminology and Definitions

Lexile is a measure used to match text difficulty with reader ability (MetaMetrics, 2006). Lexile is a scaled score instead of an exact grade level score. Any numerical grade level Lexile references will be the mean of the scaled Lexile score for that grade level.

Beginning reader is any seventh grade student who is reading below a first grade Lexile level with Lexile scores between 0L and 100L.

Far-below-grade-level reader is any seventh grade student with a Lexile score

between 101-549L.

Below-grade-level reader is any seventh grade student with a Lexile score between 549-849L.

On-grade-level reader is any seventh grade student with a Lexile score between 850-1100L.

Above-grade-level reader is any seventh grade student with a Lexile score between 1101-1500.

At-risk reader is any seventh grade student who is reading four or more grade levels below their assigned grade-level mean (Lexile scores between 0 and 650).

Struggling reader is any seventh grade student who is reading between two and three grade levels below their assigned grade-level mean (Lexile scores between 651 and 849).

Seventh grade below-grade-level reading comprehension is any seventh grade student having Lexile scores between Beginning Reader (approximately kindergarten) and 780 (approximately Fourth grade mean).

Seventh grade on-grade-level reading comprehension is any seventh grade student having Lexile scores between 850 and 1100 (Scholastic Reading Inventory, 2001).

Significance of the Study

Implications. Because reading is a complicated process, there is no one strategy, reading instructional method, or other solution to help every struggling reader (Beers, 2003). However, reading research has identified one of the differences between good readers and struggling readers is that good readers use many strategies when reading (Robb, 2000). If this study shows a relationship between students with a specific learning style and students who are struggling readers, teachers will have another tool to help those readers and possibly

prevent some of the next generation's struggling readers. Some new questions and further research could center on the following topics:

- How do computer games and video games contribute to the sensory learning styles of children?
- Could reading teachers tap into computer games, video games, texting, twittering, and other prevalent technologies to create early reading interventions?
- How do graphic novels and anime help or hinder children's reading?
- How does a person with visual, kinesthetic, auditory, or tactile learning styles use visualization? What processes does he or she go through to create a picture in his or her head?
- What percentage of the school population does not see anything when they try to visualize?
- Must a kinesthetic activity involve movement or will imagining movement work?
- Must a tactile activity involve touching or will imagination work?
- Must an auditory activity involve actual sounds or will internal or imaginary sounds work?

Applications. If this study finds that there is a relationship between having a specific sensory learning style and reading below-grade-level, teachers will be encouraged to create lesson plans that incorporate more sensory features to help those struggling readers. Finding a relationship could recommend the direct teaching of methods that help the students tap into their sensory learning styles to understand their reading. Finally, finding a relationship would encourage elementary teachers to adopt more style-specific reading activities into the curriculum. If this research shows a relationship between specific learning styles and

struggling readers, then reading experts could figure out reading strategies that work within the strengths of each of those learning styles.

Organization of the Study

Chapter One discusses the background, questions, and need for this study. Chapter Two contains a review of relevant literature and research regarding reading and learning styles. Chapter Three explains the methods and procedures that this researcher used to gather and analyze data. Chapter Four presents the statistical analyses of the data gathered. Chapter Five reports conclusions, recommendations, and implications of this study.

CHAPTER TWO: REVIEW OF LITERATURE

With all of the emphasis on reading in the elementary schools, how does a student get into seventh grade without being a proficient reader? Are there common factors that create the atmosphere for reading success in some children yet allow for reading failure in others? This chapter provides a history of reading education, a discussion of Lexile, a review of research on learning styles, a breakdown of modality learning styles, and a review of similar studies about reading and learning styles.

A History of Reading Education

Looking at history allows researchers to identify how a field like reading education has developed and changed, to understand past and present ideologies, and to provide the groundwork for current research (Fresch, 2008). Examinations of past studies help researchers look at data in different ways and see how the politics of the times may have affected the success of a reading method. Finally, reviewing the history of reading helps educators improve their understandings of the current practices because the review gives them a conceptual background for current work (Moore, Monaghan, & Hartman, 1997).

Educators have been searching for the best way to teach reading since the formation of the syllabic writing system (Adams, 2000). Throughout history, reading education has shifted from one preferred method to another as educators have sought to help students to learn to read. Before the 1500s, students learned to read by learning the sounds of the alphabet and the sounds of syllables to make words (Sweet, 1996b). In the 1500s, children learned using the sight word method, which is where students learn to read by memorizing high-frequency words (Sweet, 1996b; Wren, 2003). Then, in the 1600s, children learned using combinations of initial consonants with short vowels (Sweet, 1996a). In America,

reading education has undergone many similar shifts in instruction methods.

Colonial America. In Colonial America, students learned to read using the alphabetic principle. The colonists wanted all boys to learn to read because they believed that the inability to read was “Satan’s attempt to keep people from scriptures” (Chesapeake, n.d.; O’Neill, n.d.). Parents of most girls did not expect them to learn to read; instead they learned how to manage a household (Chesapeake, n.d.). The process of reading instruction consisted of teaching the code and then to having children read (Sweet, 1996a). After children learned the alphabet and the sounds each letter makes, they learned how to blend the syllables and how the syllables combine to make words. Paper and textbooks were scarce, so students would memorize lessons from adult books, narratives, and patriotic essays (Chesapeake College, n.d.; Sweet, 1996b). Three of the most common books students used were the Bible; a primer, which combined the study of the alphabet with Bible readings; and a hornbook, which was lessons covered by a thin sheet of transparent horn fastened on a wooden paddle (Austin, n.d.; Chesapeake College; O’Neill). People who wrote early primers used pictures of animals learning to read and write to emphasize the importance of reading and writing. The hornbook lessons included things like the alphabet, vowel and consonant combinations, and the Lord’s Prayer.

Revolutionary Era. During Revolutionary times, the need to build and maintain commerce, agriculture, and shipping began to shift the focus in education from mostly religious to a more secular tool that would establish the concepts of freedom, liberty, democracy, and responsible citizenship (Gelbrich, 1999). In 1751, Benjamin Franklin founded the Philadelphia Academy, which taught a curriculum that emphasized subjects such as modern languages, agriculture, and accounting instead of the more traditional curriculum.

Most girls still did not attend school or learn to read. Girls from wealthy families had governesses who taught sewing, drawing, music, and languages, but not reading.

After the Revolutionary War, the educational emphasis was on a common language, patriotism, and unity, and schools became places where students were educated as American citizens. In the late 1700s, Thomas Jefferson made a push for universal public schooling (Lewis, 2008). Jefferson proposed that public taxes pay for education because he believed that literacy, arithmetic, and history were of value to the public. One of Jefferson's ideas was to have two tracks in school: one for laborers and one for scholars (Sass, 2009). Scholars believe that Jefferson's ideas were influential in the foundation of public schools (Shannon, 1996). As a young, sparsely populated country, states had a difficult time achieving a standard curriculum that promoted the ideals of democracy and independence (Gelbrich, 1999). One way to achieve the standardization was in the development of textbooks. In 1783, Noah Webster introduced *A Grammatical Institute of the English Language Part 1*, a textbook that people called The Blue-back Speller (Columbia Encyclopedia, 2008). The Blue-back Speller had an emphasis on developing patriotic and moral values along with grammar and spelling (Gelbrich, 1999).

1800's. In the 1800s, as education became even more secular and the emphasis continued to evolve into helping individuals become educated, responsible citizens, European and American essays, papers, and books began encouraging people to become educated (Adams, 2000). Textbooks continued to help in the standardization of the American language and moral educational experiences. In 1806, Noah Webster published *An American Dictionary of the English Language*, which standardized English spelling (Sweet, 1996a). This publication was very important because up to that time, the way a person spelled

something depended on where the speller had learned to read and write. Some spellings that were changed include *jail* instead of *gaol*, *mold* instead of *mould*, *honor* instead of *honour*, and *public* instead of *publick* (Merriam-Webster, 2009). Webster's English spelling system remains virtually unchanged to this day. In 1841, Rev. William Holmes McGuffey published a very moralistic reader to introduce children to McGuffey's ethical code, which included the idea that a white, Anglo-Saxon Protestant was the ideal American (Chesapeake, n.d.). The children modeled in this book were prompt, good, kind, honest, and truthful. The McGuffey Readers became the most influential textbooks of the nineteenth century (Sass, 2009).

Teacher education also helped to standardize American education. In 1839, the Massachusetts government funded the first Normal School (Sass, 2009). Normal Schools were colleges where prospective teachers could learn and practice their skills in model classrooms (Cheek, n.d.). Public schools of this era were only in session for four months, and children attended sporadically. The teacher was typically anyone who was willing to teach. Because the pay was usually only thirty dollars a month, people were less likely to seek a college degree for education, and colleges were less likely to offer programs. As teachers graduated from the first Normal School, they began creating Normal Schools across the country and promoting teaching as a profession (Cheek, n.d.). In 1837, Horace Mann became the first secretary for the Massachusetts State Board of Education, which was the first Board of Education established in the United States. In 1867, the federal government created the Department of Education to help states establish effective school systems (Sass, 2009).

In 1852, Massachusetts enacted America's first mandatory attendance law (Sass, 2009). This law required all children between the ages of eight and fourteen to attend school

for at least three months each year (Grocke, n.d.). Six of the twelve required weeks had to be consecutive. The Massachusetts Compulsory Attendance Statutes from 1852-1913 (2003) stated that children who attended school in a town other than the one in which they resided, attended a private day school, or were educated in another way, such as with a private tutor, were excluded from the law. The law also excluded anyone who could prove that he or she had “already acquired those branches of learning which are taught in common schools” (section 4). The law also excluded those who were too poor or had a physical or mental impairment. In 1873, Massachusetts revised the law to require eight to twelve year olds to attend school for twenty weeks per year (Grocke, n.d.). By 1918, every state in the Union had a mandatory attendance law.

As the public became more aware of the benefits of education, the need for secondary schools became critical (Johnson, Dupuis, Musial, Hall, & Gollnic, 2002). Even while Horace Mann and other nineteenth century educational leaders argued for sectarian schools that would provide the opportunity for secondary education for all children, the focus of education continued to shift from religious to secular (Johnson et al., 2002).

In 1837, Horace Mann proposed a change in reading instruction curricula. He believed that reading instruction should begin with the memorization of whole words instead of the sound-symbol approach (Adams, 2000; Rasinski, 2003; Sweet, 1996a). Because of Mann’s proposals, schools began using graded readers, which were based on age and achievement level with an emphasis on the meaning of the text instead of decoding. This method, based on Thomas Gallaudet’s work, began as a way to teach deaf children to read (Sweet, 1996b). In 1930, William Gray and Author Gates introduced a new basal reading book that incorporated the new method. As schools began to move away from phonics to the

“look and say” method proposed by Mann, America’s reading paradigm shifted.

Oral Reading Debate. A debate over oral reading caused the next shift in reading instruction. The question was whether emphasizing oral reading or silent reading was more important (Hoffman, 1996). Educators emphasized oral reading in schools, but many researchers found that most people did not read orally in their everyday lives. Studies conducted at the time showed that silent reading produced better comprehension than oral reading did. In 1914, William Gray, a well-known reading theorist, developed the first published reading assessment. This assessment was a one-on-one measure of oral reading. Because silent reading was the preferred method for instruction and assessment, Gray’s instrument, which measured oral reading - but was time consuming - did not become popular (Pearson, 2000; Rasinski, 2003). Also, during this time more accessible books, instructional guides, and printed resources allowed teachers to instruct larger groups of students. The “look and say” approach became more common in most reading series, and oral reading was discouraged and sometimes forbidden (Rasinski, 2003). Early “look and say” primers, published by Scott Foresman in 1914, taught children to memorize the most commonly used words in the English language and added new words each year until the child had mastered a total of about 1500 words by the end of 4th grade (Sweet, 1996a). The Dick and Jane readers and Dr. Seuss’ *The Cat in the Hat* (1957) are some of the famous books that use the “look and say” method (Lemann, 1997).

Political Reforms. The book *Why Johnny Can’t Read* (1955) and the launch of the Soviet Union’s *Sputnik 1* (1957) caused another shift in reading education in American schools (Rutherford, 1998). In *Why Johnny Can’t Read* (1955), Rudolph Flesch questioned the abilities of schools to educate students (Alexander & Fox 2008; Cowen, 2003). Flesch

called for educators to teach students to read using alphabetic and phonetic approaches instead of the “look and say” method that was popular at the time. When the Soviet Union launched *Sputnik I*, many American people became concerned that the Russian space superiority was a danger to our national security and urged the passing of laws to improve education (Graves & Dykstra, 1997). *The National Defense Act*, passed in 1958, provided funding for science and math education and for other areas that were important to national security (such as reading). The goal was to have an education system that was equal to or better than the systems in other countries, and the focus was on the content and the methods (Adams, 2000; Cowen, 2003; Rutherford, 1998). Because of the public outcry created by the space race and Flesch’s book, politicians became increasingly involved in the debate over the best way to teach reading (Adams, 2000). Politicians passed laws to fund reading reforms and created committees to study effective reading instruction. These laws caused a shift back toward a phonics-based curriculum (Lemann, 1997).

One major effect of the politically backed reforms was the 1959 National Conference on Research in English. In this conference, committees noticed that there was a void on research on reading, so the U.S. Office of Education sponsored the 1967 *Cooperative Research Program in First Grade Reading Instruction: The First-Grade Studies* (Cowen, 2003). This study investigated beginning reading approaches including conditions and characteristics of the environment and the effectiveness of the approaches in relation to reading readiness. In addition to showing the importance of the role of the teacher and of teacher training, *The First Grade Studies* stated that while no one approach is the absolute best method, developing phonemic awareness and instructing phonics with a systematic and deliberate method is an effective method for teaching beginning readers (Adams, 2003;

Cowen, 2003; Pearson, 2000; Walker, 2008).

One of the reform laws that Congress passed was Title 1 of the *Elementary and Secondary Education Act of 1965*, which sought to increase academic opportunities for children from low-income neighborhoods (Snow, Burns, & Griffin, 1998). Most schools used Title 1 as a pull-out program, which is a program where students are pulled out of their regular classroom for additional academic instruction (McDonnell, 2005). When researchers evaluated the Title 1 program, the results showed little evidence of improvement, so school districts worked to reassure the federal government that they could evaluate the program in cost-benefit terms in relation to student achievement. Because of the reassurance, Congress reauthorized Title 1 and required that qualified students receive instruction in addition to their regular classroom instruction and not instead of the regular instruction (McDonnell, 2005; Snow et al., 1998). Title 1 laws have been restructured many times over the years as educators attempt to continue to narrow the achievement gap between students of low and high income; *Improving America's Schools Act of 2002* is Congress' most recent reauthorization (Shannon, 1996; Snow et al., 1998).

In 1967, Jeanne Chall compared and contrasted literacy instruction in *The Great Debate* (Adams, 2000; Cowen, 2003; Hoffman, 1996; Pearson, 2000). The debate was whether a word-with-meaning-first approach or a phonics-and-decoding approach was better for teaching reading. Through interviews with authors, specialists, and teachers, Chall showed that programs that stress a phonics approach proved to be more successful for beginning reading instruction. Chall stated that reading programs should include books with challenging vocabulary to allow students to practice decoding skills and opportunities to practice fluency. Because of *The Great Debate*, publishers changed basal textbooks for

beginning readers so that they contained stories with more challenging vocabulary and changes in instructional approaches.

The National Commission on Excellence in Education's *A Nation at Risk* (1983) began the next shift in reading education when it criticized the way students were learning to read in U.S. schools. In response, the Commission on Reading published *Becoming a Nation of Readers (BNR)* (1985), which emphasized the importance of a balance of phonics and comprehension instruction (Cowen, 2003). *BNR* defined two stages of literacy: emerging literacy, which typically begins at home and extends through the second or third grade, and extending literacy, which refers to skills used from the third grade on (Anderson, R., et al., 1985). *BNR* defined skilled reading as being constructive, fluent, strategic, and motivated, and as a lifelong pursuit. The *BNR* report stated that there is not a simple or single step that will immediately allow a child to read; instead, *BNR* said that reading is a many-stepped journey and that skilled reading requires learning and practice in multiple elements. *BNR* encouraged a combined approach to reading and emphasized the need for students to have instruction in phonics as soon as possible to allow students to read earlier and faster. Teachers were also encouraged to use phonics, writing, and authentic literature (instead of basal readers) to improve comprehension (Alvermann, 1986; Cowen, 2003; Farstrup, 2002). Authentic literature is expository and narrative texts authors write in their own native language without regard to controlled vocabulary or readability; basal readers are textbooks that authors designed to teach people to read (Basal reader, 2009; Houghton Mifflin Company, 1997).

Whole language. One significant effect of the *BNR* was the whole language movement of the early 80s (Lemmann, 1997). Pearson (2000) described this movement as a

constructivist method that has students build meaning as they read authentic literature, do activities, and write in cross content curriculums. The whole language movement, founded by Frank Smith and Kenneth Goodman, was an approach that grew out of a belief that learning to read and write English is a natural process, and the best way to teach reading and writing is to immerse students in unstructured literature (Lemann, 1997). Marie Clay's Reading Recovery program, which uses phonics and whole language theory, helped spread whole language instruction throughout the nation (Lemann, 1997). This framework created purpose for reading and writing activities within other subject area contents. The idea was that students would read best if given a purpose for reading. Even though Reading Recovery and the *BNR* recommended teaching phonics, many whole language methodologies abandoned all phonics instruction. Whole language was similar to the "look and say" method where students learned to memorize whole words, but whole language was different because educators taught the words used in authentic literature instead of the carefully chosen words of basal readers (Sweet, 1996a). As part of the whole language process, students read regular books (instead of basal readers and phonics textbooks, which emphasized specific words or phonemes). Students used inventive spelling, which involved students spelling words when they did not know the standard spelling using whatever sound or visual patterns they knew, as they wrote their own literature (Bank Street College, 1997; Sweet, 1996a). The 1988 California Reading Framework promoted the use of authentic literature and required teachers to use books with challenging text, comprehension questions, and authentic activities instead of basal readers and worksheets (Pearson, 2000; Walker, 2008).

As whole language methods began to spread across the nation, the debate over the

best way to teach reading began again. While all reading teachers understood that comprehension was the ultimate goal of reading instruction, some teachers believed that whole language was a better instructional method because educators taught students to use text to understand unknown words, while others believed phonics was a better method because educators taught students to sound out the unknown words to bring understanding.

Opponents of whole language felt that while students were successfully learning the 300-400 most common English words, they were not taught how to unlock the meaning of the other 499,700 or more words (Sweet, 1996a). Opponents of the phonics method believed that phonics instruction was boring and that students did not grasp the meanings of the words that they were sounding out (Lemann, 1997). In classrooms all across America, some teachers only used whole language methods to teach reading, others used strictly phonics, while others tried to incorporate a blend of the two. Because some students in all three types of learning environment became good readers while others struggled, a student's reading success seemed to depend on who his or her first teachers were and what methods those teachers used to teach reading.

Whole language versus phonics. In the middle of the whole language versus phonics debate of the 80s, Congress requested a report to review phonics and early reading instruction. The Center for the Study of Reading selected Marilyn Jager Adams as their lead researcher. The committee reviewed the research of *The Great Debate* and the *BNR* studies and completed a comprehensive review on reading research including alphabetic principles, early reading development, phonics and whole language, and the outward and inward nature of the reading process (Pearson, 2000). Adams published her findings in *Beginning to Read: Thinking and Learning About Print* (2000). This study found that students who were taught

using both code-emphasis and meaningful-connected texts showed superior reading achievement results. Adams stated that a young child's reading development should include instruction in phonemic awareness and explicit phonics instruction along with reading of authentic literature. The study also discussed the importance of developing automaticity with print (which is the effortless ability to identify single words with speed and accuracy), reading aloud to children, and developing independent reading skills (Cowen, 2003; Hook & Jones, 2002).

Eventually, because there was a lack of professional development and many teachers did not agree with many of the whole language methodologies, the method began to dissipate by the early 90s (Cowen, 2003). Thus began the shift toward a more balanced reading methodology that combined the best of phonics with the best of whole language.

Defining literacy and reading instruction. The increase of computer technology also created new shifts in literacy education in the late 90s as the definition of literacy expanded to include being computer literate and being able to use the Internet. Parents and researchers began to ask if technology could provide a better education than a student could get in a regular classroom. However, the U.S. Department of Education and the National Academy of Science's *Preventing Reading Difficulties in Young Children (PRD)* said that technology could not take the place of an excellent teacher (Farstrup, 2006; Snow et al., 1998).

The *PRD* stated that early childhood interventions could have prevented most adult and adolescent reading problems (Snow et al., 1998). The report defined three obstacles that prevent children from learning to read: difficulty understanding and using the alphabetic principle, failure to transfer comprehension skills from spoken language to reading and to

acquire new strategies needed for reading, and the absence or loss of the initial motivation to read or an appreciation of the rewards of reading. To help prevent these three obstacles, the *PRD* report suggested that teachers of young children provide many occasions for reading, experiences with print, and opportunities to learn about and use the alphabetic principle and the structure of spoken words. *PRD* also stressed the need to emphasize both alphabetic codes and strategies for finding meaning as part of reading instruction. The report also gave specific research-based grade-level recommendations and suggested strategies including early intervention for students at risk of reading failure (Cowen, 2003; Hiebert, 2002)

In response to this report and reports of low reading scores, the federal government and many state governments began to pass legislation to reform reading education (Wakeman, Browder, Meir, & McColl, 2007). In 1994, the *Improving America's Schools Act* required states to hold all students to high content standards. In 1997, the reauthorization of the *Individuals with Disabilities Education Act (IDEA)* required that all students have access to the general curriculum. During this time, Congress also created the National Reading Panel (NRP), which included reading experts and scientists, to review research in reading instruction and to identify the most effective approaches, skills, and methods in kindergarten through third grade (Cowen, 2003; National Institute of Child Health and Human Development, 2000; Shanahan, 2003).

The NRP evaluated research about the five major issues defined by the *PRD* report: phonemic awareness and phonics, fluency, comprehension, teacher education and reading instruction, and computer technology and reading instruction (National Institute of Child Health and Human Development., 2000). The study only reviewed experimental evidence research about the effectiveness of the instructional procedures to help prevent bias (Cowen,

2003; Shanahan, 2002). The NRP defined five areas of reading instruction as phonemic awareness, phonics, fluency, vocabulary, and text comprehension. The results included the research findings and the most effective instruction for each of the areas (Armbruster, Lehr, & Osborn, 2001).

No Child Left Behind. In 2002, the *No Child Left Behind Act of 2001 (NCLB)*, which was a reauthorization of the *Elementary and Secondary Education Act (ESEA) of 1965*, became law. The primary goal behind the NCLB legislation was to close the achievement gaps between minority, disabled, disadvantaged, and limited English proficiency students and their peers (United States Department of Education, 2004). To meet this goal, NCLB required each state to have an accountability plan and to use proven educational methods. The law provided for increased flexibility and local control and provided more options for parents. Additionally, states were required to hire highly qualified teachers. The beliefs behind NCLB are that students should demonstrate achievement, that schools should set high goals and expectations, and that states should hold schools accountable for student learning (Congressional Digest, 2008). The ultimate goal of NCLB in regards to reading is to have all children reading at grade level or better by 2014 (Cortiella, 2005).

NCLB requires all Title I schools to have a plan to help low achieving students (Cortiella, 2005). The plan must include information about which assessments schools will use to identify these students, what additional help the schools will provide for these students, and how the school will integrate other Title I services with the plan. One program started by NCLB is Reading First (Baker et al, 2007; Wright & Wright, 2009). Reading First funds high-quality comprehensive research-based reading reforms.

An important part of the research-based reading reforms included the creation of tests and assessments that educators could use to determine if students were reading on grade level. One company, MetaMetrics, began research into creating an assessment that could match readers to text in the 70s (MetaMetrics, 2008a). Their research led to the development of The Lexile Framework.

A Discussion of Lexile

Lexile is a measurement expressed as a number that can indicate the difficulty of a text and a person's reading ability (MetaMetrics, 2008e). This research uses students' Lexile scores to determine the reading level of the subjects (e.g. below, on, or above grade level).

The Lexile Framework. The Lexile Framework[®] is a scientific method to measure text difficulty and reading ability (Smith, M., 2004). The framework consists of a Lexile measure, which is a text difficulty or reading ability score followed by an "L" (850L), and a Lexile scale, which is a developmental scale of reading that ranges from below 200L for beginning readers and text to above 1700L for advanced readers and text (MetaMetrics, 2008f). Lexile has become the most widely used reading measure in the U.S. today as over 115,000 books, 80 million articles, and 60,000 websites already have Lexile measures, and more than 150 publishers have identified the Lexile of their materials (MetaMetrics, 2008a, 2008f).

Lexile Scores and Texts. Lexile scales measure text difficulty. As with many other reading scales, semantic difficulty (which is word frequency) and syntactic complexity (which is sentence length) are the basis for Lexile measures for texts (MetaMetrics, 2008f). Unlike other reading scales, Lexile measures use the whole text and not just parts of the text to identify the text level. In order to identify the Lexile score of a specific text or article, the

Lexile Analyzer divides each text into 125 word slices. The Analyzer counts the words in each slice and compares each slice to a collection of almost 600 million writings from a variety of sources and genres to determine word frequency. Next, the Analyzer puts the information into the Lexile equation to determine a Lexile measure for each slice. Finally, the Analyzer applies the Rasch psychometric model to the results from each slice to determine a Lexile measure for the entire text (Lennon & Burdick, 2004). Table 2.1 shows the Lexile level of a sample of books, tests, and textbooks.

Table 2.1: Examples of Lexile in Texts

	Literature titles	Tests and Textbooks
200L	<ul style="list-style-type: none"> • <i>Danny and the Dinosaur</i> by Syd Hoff - 200L • <i>Play Ball, Amelia Bedelia</i> by Peggy Parish – 220L • <i>The Trouble with Pets</i> by Sheila Keenan – 250L • <i>The Cat in the Hat</i> by Dr. Seuss – 260L 	<ul style="list-style-type: none"> • <i>My Pet Pup</i>; Benchmark Education – 240L • <i>Parades</i>: Houghton Mifflin – 270L • <i>Test of Adult Basic Education (TABE-L)</i> – 270L
300L	<ul style="list-style-type: none"> • <i>Pet Shop</i> by Ezra Jack Keats – 300L • <i>Noisy Nora</i> by Rosemary Wells – 320L • <i>Clifford, the Small Red Puppy</i> by Norman Bridwell - 330L • <i>Arthur's Nose</i> by Marc Brown – 	<ul style="list-style-type: none"> • <i>Stanford Achievement Test (SAT9-Primary 1)*</i> - 340L • <i>My World</i>: Harcourt Brace – 350L • <i>Carousels</i>; Houghton Mifflin – 390L

	350L	
	Literature titles	Tests and Textbooks
400L	<ul style="list-style-type: none"> • <i>Frog and Toad are Friends</i> by Arnold Label – 400L • <i>Henry and Mudge and the Forever Sea</i> by Cythia Rylant – 420L • <i>Madeline</i> by Ludwig Bemelmans – 480L • <i>Harold and the Purple Crayon</i> by Crockett Johnson - 490L 	<ul style="list-style-type: none"> • <i>Once Upon a Hippo</i>; Scott Foresman – 480L • <i>Imagine That!</i> – Scholastic Inc – 440L
500L	<ul style="list-style-type: none"> • <i>Karen’s Chain Letter</i> by Ann M. Martin- 510L • <i>It’s all Greek to Me</i> by John Scieszka- 530L • <i>Sarah, Plain and Tall</i> by Patricia MacLachlan- 560L • <i>The Whipping Boy</i> by Sid Fleischman – 570L 	<ul style="list-style-type: none"> • <i>Stanford Achievement Test (SAT9-Primary 2)*</i> - 500L • <i>People and Places</i>: Silver Burdett Ginn – 540L
600L	<ul style="list-style-type: none"> • <i>M.C. Higgins, the Great</i> by Virginia Hamilton - 620L • <i>Holes</i> by Louis Sachar – 660L • <i>Number the Stars</i> by Lois Lowry - 	<ul style="list-style-type: none"> • <i>Stanford Achievement Test (SAT9-Primary 3)*</i> - 610L • <i>One Nation Many People, Volume One</i>; Globe Fearon – 680L

	670L <ul style="list-style-type: none"> • <i>Charlotte's Web</i> by E.B. White – 680L 	
	Literature titles	Tests and Textbooks
700L	<ul style="list-style-type: none"> • <i>From the Mixed Up Files of Mrs. Basil E. Frankweiler</i> by E.L. Konigsberg – 700L • <i>Walk Two Moons</i> by Sharon Creech - 760L • <i>Harriet the Spy</i> by 760L • <i>The Giver</i> by Lois Lowry- 770L 	<ul style="list-style-type: none"> • <i>Health 4: McGraw-Hill School Division</i> – 720L • <i>Test of Adult Basic Education (TABE-E)*</i> - 730L • <i>Stanford Achievement Test (SAT9-Intermediate 1)*</i> - 760L
800L	<ul style="list-style-type: none"> • <i>Scooter</i> by Vera B. Williams - 800L • <i>Maniac Magee</i> by Jerry Spinelli - 820L • <i>Julie of the Wolves</i> by Jean Craighead George - 860 • <i>The View from Saturday</i> by E.L. Konigsburg - 870L 	<ul style="list-style-type: none"> • <i>Stanford Achievement Test (SAT9-Intermediate 2)*</i> - 810L • <i>National Assessment of Educational Progress (NAEP-Grade 4)*</i> - 820L • <i>Word 97; Glencoe McGraw-Hill</i> – 870L
800L		
900L	<ul style="list-style-type: none"> • <i>Roll of Thunder, Hear Me Cry</i> by Mildred Taylor – 920L • <i>The Golden Compass</i> by Philip Pullman - 930L 	<ul style="list-style-type: none"> • <i>National Assessment of Educational Progress (NAEP-Grade 8)*</i> - 990L • <i>World Cultures: A global Mosaic;</i>

	<ul style="list-style-type: none"> • <i>Bud, Not Buddy</i> by Christopher Paul Curtis - 950L • <i>Exploring the Titanic</i> by Robert Ballard – 980L 	<p>Prentice Hall – 940L</p> <ul style="list-style-type: none"> • <i>Stanford Achievement Test (SAT9-Advanced 2)*</i> - 930L • <i>Test of Adult Basic Education (TABE-M)*</i> - 910L
	Literature titles	Tests and Textbooks
1000L	<ul style="list-style-type: none"> • <i>Freak the Mighty</i> by Rodman Philbrick – 1000L • <i>Island of the Blue Dolphins</i> by Scott O’Dell - 1000L • <i>20,000 Leagues Under the Sea</i> by Jules Verne – 1030L • <i>All Things Bright and Beautiful</i> by James Herriot - 1070L 	<ul style="list-style-type: none"> • <i>Test of General Educational Development (GED)*</i> – 1030 L • <i>Test of Adult Basic Education, General Form (TABE-D) *-</i> 1050L • <i>Writing & Grammar: Gold Level;</i> Prentice Hall – 1040L
1100L 1100L	<ul style="list-style-type: none"> • <i>Pride and Prejudice</i> by Jane Austen – 1100L • <i>The Pickwick Papers</i> by Charles Dickens -1160L • <i>Animal Farm</i> by George Orwell – 1170L • <i>Hiroshima</i> by John Hersey - 1190L 	<ul style="list-style-type: none"> • <i>Stanford Achievement Test (SAT 9-TASK 2)*</i> - 1100L • <i>Modern Biology;</i> Holt, Reinhart & Winston – 1130L • <i>National Assessment of Educational Progress (NAEP-Grade 12)*</i> - 1150L
1200L	<ul style="list-style-type: none"> • <i>The Trumpeter of Krakow</i> by Eric P. 	<ul style="list-style-type: none"> • <i>American College Testing</i>

	<p>Kelly - 1200L</p> <ul style="list-style-type: none"> • <i>Great Expectation</i> by Charles Dickens – 1200L • <i>Dragon Seed</i> by Pearl S. Buck - 1240L 	<p><i>Program (ACT)* - 1210L</i></p> <ul style="list-style-type: none"> • <i>Armed Services Vocational Aptitude Battery (ASVAB)* - 1230L</i> • <i>Understanding Sociology; McGraw-Hall – 1290L</i>
	Literature titles	Tests and Textbooks
1300L	<ul style="list-style-type: none"> • <i>The Further Adventures of Robinson Crusoe</i> by Daniel Defoe – 1300L • <i>The Snow Leopard</i> by Peter Matthiessen -1330L • <i>The Hunchback of Notre Dame</i> by Victor Hugo -1340L • <i>The Deerslayer</i> by James Fenimore Cooper – 1380L 	<ul style="list-style-type: none"> • <i>Psychology: An Introduction; Prentice Hall – 1320L</i> • <i>Medical College Admission Test (MCAT)* - 1330L</i> • <i>Scholastic Aptitude Test (SAT)* - 1330L</i> • <i>Law School Admission Test (LSAT)* - 1380L</i> • <i>College Board Achievement Test in English (CBAT)* - 1380</i> • <i>Graduate Record Exam (GRE)* - 1390L</i>
1400L	<ul style="list-style-type: none"> • <i>The Life and Times of Frederick Douglass</i> by Frederick Douglass – 1400L • <i>Ivanhoe</i> by Sir Walter Scott – 1410L 	<ul style="list-style-type: none"> • <i>Test of English as a Foreign Language (TOEFL)* - 1400L</i> • <i>Certified Public Accountant Examination (CPA)* -1430L</i>

	<ul style="list-style-type: none"> • <i>The Legend of Sleepy Hollow</i> by Irving Washington -1440L • <i>Ring of Bright Water</i> by Gavin Maxwell -1490L 	<ul style="list-style-type: none"> • <i>Criminal Justice Today</i>; Prentice Hall – 1430L • <i>Graduate Management Admission Test (GMAT)*</i> - 1440L
	Literature titles	Tests and Textbooks
1500L	<ul style="list-style-type: none"> • <i>The Decameron</i> by Giovanni Boccaccio -1500L • <i>Don Quixote</i> by Miguel De Cervantes – 1500L • <i>A Fable</i> by William Faulkner – 1520L • <i>The Good Earth</i> by Pearl S. Buck – 1530L 	<ul style="list-style-type: none"> • <i>The Making of Memory: From Molecules to Mind</i>; Doubleday – 1500L • <i>On Human Nature</i>; Howard University Press – 1510L • <i>Culture/ Power/ History: A Reader in Contemporary Social Theory</i>; Princeton University Press
1600L	<ul style="list-style-type: none"> • <i>Sons</i> by Pearl S. Buck - 1660L • <i>Descartes: Philosophical Essays</i> by Laurence LaFleur – 1630L • <i>Concerning Civil Government</i> by John Locke - 1690L • <i>First Inaugural Address</i> by George Washington – 1700L 	<ul style="list-style-type: none"> • <i>The American Constitution: Cases, Comments, Questions, 7th ed.</i>; West Publishing • <i>The Principles of Scientific Management</i>; Dover Publications – 1670L

(MetaMetrics, n.d., 2008b; Scholastic, 2003;

The Lexile Analyzer treats some books differently because of textual features such as pictures, graphs, tables, charts, and non-standard punctuation that change the readability

(MetaMetrics, 2009). In order to help educators and readers know if additional information beyond the Lexile score would help readers select books, MetaMetrics developed Lexile codes, which are two letter designations in front of a Lexile score that gives more information about a book. These designations help the reader understand the Lexile for these special types of books. Many picture books have the AD, adult directed, designation because an adult usually reads the book to a child. Any text that receives a score of 0L or below is given a code of BR, beginning reader. Like the AD books, these are often read to children. NC, non-conforming, means that the Lexile score is higher than what is usual for the intended audience. Giving a book a NC designation helps match high-ability readers with books that are developmentally appropriate. The Lexile Analyzer gives books that are easy to read, but are intended for older audiences a HL Designation because they have high interest but low readability. IG, illustrated guide, books are texts with independent sections of texts that readers can read in any order without affecting the flow of the book. IG books typically have lots of technical vocabulary, illustrations, quotes and facts, or discrete topics on one or two pages. The Lexile Analyzer gives a graphic novel or comic book the GN designation because the Lexile score cannot include the picture support. Finally, the Lexile Analyzer gives any book with 50% non-standard or non-conforming prose the designation of NR, non-prose. Non-prose books would include writing styles that do not fall under the definition of prose (ordinary writing as opposed to verse) such as poetry, dramatic texts, songbooks and others. NP books do not have a Lexile score as the incomplete sentences and non-standard punctuation creates an invalid Lexile. Table 2.2 includes example of some books with each of these codes.

Table 2.2: Examples of Texts with Lexile Codes

AD	<ul style="list-style-type: none"> • <i>Abiyoyo Returns</i> by Pete Seeger – AD210L • <i>Bee my Valentine</i> by Miriam Cohen – AD450L • <i>Babar Saves the Day</i> by Laurent De Brunhoff – AD520L • <i>Where the Wild Things Are</i> by Maurice Sendak - AD740L
BR	<ul style="list-style-type: none"> • <i>Hop on Pop</i> by Dr. Suess – BR • <i>The Hogboggit</i> by Clare Bowes – BR10L • <i>Lift-off</i> by Diana Noonan – BR30L • <i>Slides</i> by Beth Braddock– BR90L
NC	<ul style="list-style-type: none"> • <i>Tim’s Favorite Toy</i> by Jenny Giles – NC 230L • <i>Bone: Out of Boneville</i> by Jeff Smith – NC360L • <i>Do Cows Eat Cake?</i> By Michael Dahl – NC690L • <i>Amazing Aircraft</i> by Seymour Simon’s - NC710L
HL	<ul style="list-style-type: none"> • <i>Blade: Playing Dead</i> by Tim Bowler - HL360L • <i>Sticks and Stones</i> by Beth Goobie - HL430L • <i>Oy, Joy!</i> By Lucy Frank – HL580L • <i>Dead is a State of Mind</i> by Marlene Perez – HL620L
IG	<ul style="list-style-type: none"> • <i>Small and Large</i> by Arlene Block – IG240L • <i>Birds of Prey</i> by Gerald Legg - IG320L • <i>Hershey’s Chocolate Math From Addition to Multiplication</i> by Jerry Pallotta – IG500L • <i>What Did Dinosaurs Eat? And Other Things You want to Know about</i>

<i>Dinosaurs</i> by Elizabeth MacLeod – IG600L	
GN	<ul style="list-style-type: none"> • <i>20,000 Leagues Under the Sea</i> by Adam Grant and Terry M West – GN280L (This is a graphic novel based on the book by Jules Verne.) • <i>Demeter & Persephone: Spring Held Hostage (A Greek Myth)</i> by Justine Fontes & Ron Fontes – GN490L • <i>To Dance: A Ballerina’s Graphic Novel</i> by Siena Cherson Siegel- GN610L • <i>1918 Flue Pandemic</i> by Katherine Krohn – GN700L
NP	<ul style="list-style-type: none"> • <i>Alligators All Around</i> by Maurice Sendak • <i>Rock-A-Bye-Baby: Lullabies for Bedtime</i> by Margaret Walty • <i>The Tragedy of King Lear</i> by William Shakespeare • <i>Walt Whitman: Poetry for Young People</i> by Walt Whitman

(MetaMetrics, n.d., 2008b, 2009)

Lexile Scores and Readers. Lexile scores reflect reading ability. Educators, parents, and students can obtain Lexile measures for the student from a variety of sources. Many reading programs and testing programs use Lexile, and all major standardized tests can report reading scores as Lexile measures (MetaMetrics, 2008a). Because a Lexile score measures reader ability and text difficulty with the same scale, the number can be immediately used to help students read with success (MetaMetrics, 2008d). If students choose books within their Lexile range, which is between 100L below and 50L above their Lexile score, they can expect to have at least a 75% comprehension rate (Lennon & Burdick, 2004; Measured Progress, n.d.; MetaMetrics, 2008f). A child’s Lexile score should grow as he or she progresses through the school year making it easy for educators to see progress or to catch problems early (MetaMetrics, 2008d).

Lexile and SRI. Scholastic and MetaMetrics developed The Scholastic Reading Inventory (SRI) – the reading assessment used in this study – using the Lexile Framework (Scholastic, n.d.b). The creators took passages from authentic fiction and nonfiction texts to develop questions. Each question has a passage, a cloze response (which is a short text with blanks where some of the words should be), and four distracters (Mayer, Michael, & Valchar, n.d; Scholastic, n.d. b). Table 2.3 shows three sample SRI questions along with the Lexile for the text.

Table 2.3: SRI Item Sample

<p>Johnny was out West now. He stooped by a river. He dug a hole. Inside he put an apple seed. Then he covered it with dirt.</p> <p>He _____ the seed.</p> <p>A. watered</p> <p>B. planted</p> <p>C. tasted</p> <p>D. needed</p>	100L
<p>Once each week the young Franklins took turns telling a story. It could be sad or funny. It could be an adventure on land or sea. It could not be a story they had read or heard. Whoever told the story had to make it up.</p> <p>The stories came from their _____.</p> <p>A. books</p> <p>B. televisions</p> <p>C. imaginations</p> <p>D. diaries</p>	370L

<p>Mother and Oliver and Amanda sat at the kitchen table. They listened to the rain outside. They smelled the smell of baking cookies.</p> <p>They were _____</p> <p>A. relaxing</p> <p>B. driving</p> <p>C. swimming</p> <p>D. walking</p>	500L
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(Scholastic, 2005)

Theoretical Framework: Learning Style

A learning style is a preference for the way a person learns and remembers what he or she has learned (Wayman, 2003). Human development and cultural experiences of home, school, and society form learning style, a composite of psychological, affective, and cognitive behaviors, which is a relatively reliable indicator of how a person responds to, interacts with, and perceives the learning environment. A person's learning style creates ways of thinking and of representing information (Ouellette, 2000). A person acts differently than other people because his or her behavior is an external reflection of how that person understands situations (Guild & Grager, 1998). Because learning style is part of what makes a person the person he or she is, learning style becomes an essential part of any educator's philosophy of education; learning style affects every aspect in the classroom including curriculum development, classroom management, and daily practices.

While no one knows who first defined individual differences as *learning styles*, Hippocrates (460BC-377BC) wrote about four distinct personality types: Sanguine, Choleric, Melancholy, and Phlegmatic (Guild & Garger, 1998; Ouellette, 2000). In this century,

psychologists have been the most active researchers on personality types and styles, and psychologists and educators have transferred that research into the realm of education. Some of the best-known examples include Jung's psychological types, Gregorc's Mediation Abilities, Kolb's Experiential Learning, Dunn and Dunn's Learning Style elements, McCarthy's 4MAT system, Gardner's Multiple Intelligences, Barbe and Swassing's Modalities, and Dunn and Dunn's Modalities (Cassidy, 2004; Guild & Garger, 1998). Jung's types include Extraversion-Introversion, Sensing-Intuition, Thinking-Feeling, and Judgment-Perception (CAPT, 2009). Gregorc defined the areas as Concrete-Sequential, Abstract-Sequential, Abstract-Random, and Concrete-Random (Sauve, n.d.). Kolb defined them as Converger, Diverger, Assimilator, and Accommodator (Anderson, M., n.d.). Dunn and Dunn identified 21 elements grouped into five categories that include environmental, emotional, sociological, psychological, and physical preferences (Guild & Garger, 1998; UCLA, n.d.). McCarthy defined four types of learning: Dynamic, which included doing and feeling; Imaginative, which included learning and feeling; Common sense, which included thinking and doing; and Analytic, which included listening and thinking (About Learning, n.d.). Gardner defined eight areas of intelligence including Linguistic, Logical-mathematical, Musical, Bodily-kinesthetic, Spatial, Interpersonal, Intrapersonal, and Naturalist intelligence (Smith, M., 2008). Barbe and Swassing and Dunn and Dunn identify learners as Auditory, Kinesthetic, or Visual (Heredia, 1999).

All of these theories describe the various ways that people learn using different aspects of psychological theorems. Guild and Garger state that the label (auditory, visual, kinesthetic, convergent, divergent, concrete-sequential, or abstract random) that an educator uses to describe a student's style is not as important as respecting and accommodating the

different styles in a classroom (1998). This author chose to use Barbe and Swassing and Dunn and Dunn's modality learning style theory to complete this research.

Learning style preferences and academics. One thing that all of the learning style theories described above have in common is the idea that students will learn best when they are taught using strategies that fit well with their learning styles. Over the last 40 years, thousands of well-documented studies that were focused on individual learning styles have shown that when learning style is accommodated, academic achievement is enhanced (Barbe & Swassing, 1979; Cafferty, 1981; Carbo, 1980; Dwyer, 1998; Farr, 1971; McCarthy, 1994; Simpson & Yunfel, 2004; and Trautman, 1979). These same studies show that when educators present lessons only in students' less preferred learning styles, performance declines. Dunn & Dunn believed that if educators would use techniques that address learning style preferences, there would be significant increases in reading and math achievement (1978). The National Association of Secondary School Principals' (NASSP) report *Breaking Ranks: Changing an American Institution* recommended that teachers use a variety of instructional strategies to accommodate individual learning styles of students (1996).

If teachers consistently taught using strategies that are opposite to the strategies that a learner with a strong, specific learning style uses, that student must use part of his or her energy to shift approaches before concentrating on the skill (Guild & Garger, 1998). Using different strategies that engage students with different learning styles encourages students to become more balanced and diverse in their learning (Silver, Strong, & Perini, 2000). However, when a teacher's learning style preference dominates the classroom environment, students whose styles match do assignments easily – sometimes without any deep thinking – while students whose styles are different become disengaged and unmotivated. In *The*

Differentiated Classroom: Responding to the Needs of all Learners, Tomlinson states that the “one-size-fits-all” system of education has failed because that system ignores differences in the way students learn (1999). Guild and Garger state that the search for the “best” method to teach students leads to failure for those who have a learning style that does not accommodate that method (1998). To further complicate the failure cycle, students are often remediated in the same method that they are struggling with; a student who has not learned to read with phonics is often given intensive phonics instruction. Learning style theory would say that expecting any single method or approach to work with all learners is unrealistic.

Wayman says that a student who happens to be a visual learner wins in the “Game of school” (2003). To read the board, study their books, create written reports and take written tests, students must process information through visual channels. Standardized tests and even classroom tests are usually in a written format, which is easier for a person with a visual learning style. Even the qualities of neatness and organization, which educators stress so highly, are easier for a person with a visual learning style. Finally, all three of the three “Rs” of education, reading, writing, and arithmetic, are areas of education where a person uses visual skills constantly. Haggart states that because the majority of educators have visual preferences, the traditional educational system favors visual learners (2003).

However, research has shown that students with kinesthetic and auditory learning styles are more likely to underachieve in school because they have limited opportunities to use their style strengths in the classroom (Guild & Garger, 1998). When there is a difference in a student’s learning style and the way that the school system teaches and tests him or her, there is a mismatch of styles; this causes academic problems (Wayman, 2003). Designing lessons with opportunities for students to use their preferred learning styles gives students

powerful tools, especially if the concept or skill is a difficult one, because the students will learn faster and easier (DeBruyn, 2003). Unfortunately, even though many teachers try to accommodate students with differing learning styles, during the high stakes testing that many states require students with good visual learning strategies will succeed better than ones without those strategies (Wayman, 2003). Kinesthetic, tactile, and auditory learners who do not efficiently use the imaging techniques that visual learners use have slower, less efficient recall even if they have studied the materials. They have slower recall because they are trying to access the information that they have learned through their individual learning preferences and then translate that information into a visual format for the test. Computer tests could be designed to help some of these students do better on tests, but current computer-based testing is little more than the pencil and paper test on a flat screen.

Modality Learning Styles

Some of the ways that educators can identify students' learning style preferences are by listening to them talk, watching them work, and having them take an assessment (Wayman, 2003). Students will often use verbs that indicate their preferred learning style (Timmins, 2008). A person who prefers a kinesthetic learning style uses many action, touching, or feeling words. This child might say, "That touched me," "That moved me," or "That doesn't feel right." A person who prefers a tactile learning style also uses touching and feeling words, but they are more likely to involve the hands. This child might say, "I can grasp that," "I can wrap my hands around that," or "That feels cold." A person with a verbal learning style will use auditory type words. She might say, "I hear you," "That sounds good to me," or "That clicked." A person who prefers a visual learning style uses camera type words that create a visual picture. This child might say, "I'm looking for answers," "I get the

picture,” or “I see.” Listening to the types of verbs a child uses can tell an educator what type of learner a particular person is. Likewise, watching students can help educators determine learning style. A student who is always wiggling in his or her seat and who uses many gestures when speaking might be a kinesthetic learner. A student who interrupts class with little comments and has trouble being silent might be an auditory learner. A student who is always nicely dressed and has trouble remembering verbal directions might be a visual learner. An additional way for teachers to discover students’ learning styles is to have them take an assessment such as the Kaleidoscope Profile, which is the assessment used for this research.

Kinesthetic learners. Kinesthetic learners prefer to learn by doing and direct involvement (Haggart, 2002; Hutton, 2006b). Kinesthetic learners learn best when they incorporate movements using their large or gross motor muscles (Keys Learning, 1993). This type of learner is always moving, often prefers to learn in a single style, and struggles to convert what he or she has learned into writing (Wayman, 2003). Younger kinesthetic learners often have trouble remembering what others tell them or show them unless given frequent reminders (Carbo, Dunn, & Dunn, 1998). Exploring, manipulating items, building and playing games are their favorite learning approaches (Haggart, 2003). When engaged in learning, kinesthetic learners tend to use animated gestures and move around the room. Kinesthetic learners have a hard time making pictures in their minds as they tend to think that imagery is not important unless action is involved (Barbe & Swassing, 1979; Haggart, 2002; Wayman, 2003). Kinesthetic learners typically get in trouble in class because they act out physically through body movements and gestures, and they are often mislabeled as having ADHD (attention deficit hyperactivity disorder) (Fliess, 2006; Haggart, 2003). Because they

are not interested in visual or auditory presentations, kinesthetic learners often seem distracted (Haggart, 2002). About forty percent of all students prefer the kinesthetic learning style while only about five percent of educators prefer the kinesthetic learning style, so educators have a harder time relating to the problems that the students are having (Guild & Ulrich, 1998; Keirseley & Bates, 1984; Haggart, 2003). Teachers with kinesthetic preferences have very active classrooms, and they tend to use actions to discipline (Haggart, 2003). These teachers prefer projects and group work for classroom activities. Some strategies that educators can use to help kinesthetic learners include having them put information on cards and walk around as they memorize; allowing them to bounce their feet, twirl their pens, or squeeze a ball while they learn; and breaking up instruction for them into 20-30 minute sections (Farwell, 2010a). Tables 2.4 – 2.9 show additional information about kinesthetic learners.

Tactile learners. Tactile learners prefer to learn by touching and by converting physical inputs into emotions (Dybvig, 2005; Haggart, 2002). Tactile learners learn best when they incorporate their sense of touch and when they involve their emotions and feelings (Keys Learning, 1993). They want to explore subtle physical and emotional distinction in their learning. When engaged in learning, tactile learners use excited facial expressions as they mirror the students around them. Tactile learners will learn vocabulary best if teachers introduce it to them with tactile resources before reading (Carbo et al., 1998; Dunn, 2006). When using imagery, tactile learners tend to prefer imagery related to emotions, colors, and moods instead of sights and sounds. Tactile learners typically get in trouble in class because they withdraw or complain about what is unfair (Haggart, 2003). Emotional conflicts, temperature changes, and changes in moods easily distract tactile learners (Haggart, 2002).

About 15 percent of all students prefer the tactile learning style while about twenty-five percent of educators prefer the tactile learning style (Haggart, 2003). Teachers with tactile preferences tend to focus on self-esteem, social skills, and self-expression. They work to create warm classroom environments where students can work together. Some strategies that educators can use to help tactile learners include having them use manipulatives; encouraging them to type their notes, essays, or vocabulary words; and having them make emotional connections with their learning (Cook, 2009; Keys Learning, 1993). Tables 2.4 – 2.9 show additional information about tactile learners.

Auditory learners. Auditory learners prefer to learn by verbal instructions from themselves or others (Haggart, 2002). Thus, discussions, “thinking out loud,” and listening are their favorite learning approaches (Haggart, 2003). Phonics is often a good method to teach auditory beginning readers (Dunn, 2006). When engaged in learning, auditory learners tend to use animated voices. Having some white noise or quiet music playing helps auditory learners concentrate (Freitas, 2006). When using imagery, they tend to subvocalize and think in sounds. The specific details are not important (Barbe & Swassing, 1979). Auditory learners typically get in trouble in class because they talk out of turn and argue. Sounds easily distract auditory learners (Hutton, 2006a). About ten percent of all students prefer the auditory learning style while about thirty percent of educators prefer the auditory learning style (Haggart, 2002, 2003). Teachers with auditory preferences tend to lecture, ask questions, and include discussion, audio tapes, and reading aloud as part of their classroom activities (Haggart, 2003). Some strategies that educators can use to help auditory learners include having them record themselves reading things they have to memorize; encouraging them to put important facts and data into songs or poems; and having them reading along

with books on tape (Farwell, 2010b). Tables 2.4 – 2.9 show additional information about auditory learners.

Visual learners. Visual learners prefer to learn by seeing and watching demonstrations (Haggart, 2002). Thus, observations, examinations, and reviews are their favorite learning approaches (Haggart, 2003). When engaged in learning, visual learners tend to work quietly but intensely. They often doodle while they are listening (Smith, L., 2006). Highlighting, creating graphs, and drawing pictures are some of their preferred learning activities (Fleming, N., 2009). When using imagery, visual learners tend to think in pictures and visualize in detail (Barbe & Swassing, 1979). Visual learners typically get in trouble in class because they use visual, non-verbal expressions and passive-aggressive behavior (Haggart, 2003). Visual learners tend to be organized and noticed detail (Hutton, 2006c). Visual disorder and movement easily distract visual learners (Haggart, 2002). About thirty-five percent of all students prefer the visual learning style while about forty percent of educators prefer the visual learning style (Haggart, 2003). Teachers with visual preferences tend create a calm, academic environment in their neat, organized, attractive classrooms. They demonstrate, write, and draw on the board as part of their classroom activities (Haggart, 2003). Some strategies that educators can use to help auditory learners include having them use highlighters to underline or circle words in texts; encouraging them to take notes and make lists; and showing them how to make outlines of information in reading material (Fleming, G., 2010). Table 2.4 shows additional information about visual learners.

Table 2.4: Kinesthetic, Tactile, Auditory, and Visual learners

	Kinesthetic	Tactile	Auditory	Visual
Are natural at:	<ul style="list-style-type: none"> • Working on hands on projects • Participation in adventures competitions, and challenges • Dancing, running, jumping, leaping, rolling, and swimming • Using large motor muscles 	<ul style="list-style-type: none"> • Using interpersonal skills • Anticipating people's feelings • Understanding nonverbal communication • Fine motor activities like graphics, crafts, and calligraphy • Writing in cursive 	<ul style="list-style-type: none"> • Extemporaneous speaking • Noticing sounds • Remembering names of people he or she meets, but forgetting faces • Working with languages • Noticing small shifts in voice intonation 	<ul style="list-style-type: none"> • Remembering details and colors • Reading, spelling, proofreading • Remembering faces (forgets names) • Creating mental images • Dressing well
Solves problems by:	<ul style="list-style-type: none"> • Taking action • Physically attacking problems 	<ul style="list-style-type: none"> • Thinking • Talking to people • Choosing a 	<ul style="list-style-type: none"> • Talking about pros and cons • Talking about options 	<ul style="list-style-type: none"> • Reading information, listing problems

Solves problems by:	<ul style="list-style-type: none"> • Seeking solutions that involve physical activities • Working individually or in small groups • Exploring with trial and error 	<p>solution because it feels right</p> <ul style="list-style-type: none"> • Going at his or her own pace 	<ul style="list-style-type: none"> • Asking others what they would do • Verbalizing possible solutions • Repeating problem aloud while discussing solutions 	<ul style="list-style-type: none"> • Preparing graphic organizers • Using flow charts • Visualizing solutions
	Kinesthetic	Tactile	Auditory	Visual
Reading and studying habits	<ul style="list-style-type: none"> • Reading on the floor or bed • Studying for short periods 	<ul style="list-style-type: none"> • Studying in pleasant surroundings • Studying with people 	<ul style="list-style-type: none"> • Sub vocalizing internally when reading or studying • Listening to music while reading or studying • Using mnemonics 	<ul style="list-style-type: none"> • Reading rapidly • Requiring quiet during studying or reading

	Kinesthetic	Tactile	Auditory	Visual
Reading preferences	<ul style="list-style-type: none"> • How to books • Action oriented books • Reading to learn instead of for pleasure • Reading short plays, books, and articles 	<ul style="list-style-type: none"> • Reading for pleasure • Reading at his or her own speed • Selecting his or her own books • Prefers historical, romantic novels, or biographies 	<ul style="list-style-type: none"> • Reading dialogues and plays • Discussing content with others • Sounding out words phonetically 	<ul style="list-style-type: none"> • Reading for pleasure • Being able to spend a long time studying or reading
Difficulties	<ul style="list-style-type: none"> • Interpreting non-verbal communication • Effectively using verbal skills • Sitting still • Listening for 	<ul style="list-style-type: none"> • Staying on task when feelings are hurt • Succeeding without teacher approval or respect 	<ul style="list-style-type: none"> • Reading quickly when not allowed to vocalize • Reading silently for prolonged periods of time • Following 	<ul style="list-style-type: none"> • Working in a noisy environment • Listening to lectures without pictures, or graphics • Dealing with

Difficulties	<p>more than a few min</p> <ul style="list-style-type: none"> • Spelling • Using cursive handwriting • Sticking with one activity for long periods 	<ul style="list-style-type: none"> • Working in uninteresting classroom • Working in groups if unsure of other people's feelings 	<p>written directions</p> <ul style="list-style-type: none"> • Focusing on illustrations • Taking timed tests • Living with enforced silence 	<p>distracting appearances</p> <ul style="list-style-type: none"> • Working in drab classrooms • Working in over stimulating visual classrooms
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(Barbe & Swassing, 1979; Haggart, 2003)

Learning Styles and Reading

The reading process is primarily visual because a student must look at a word and understand all of the meanings within the use of that word (Barbe & Swassing, 1979). Even after moving beyond word recognition, visualization continues to be a major part of the reading process. Wilhelm (2004) stated that being able to create images and mental models is an essential element of reading comprehension. The need to create images and mental models puts auditory, kinesthetic, and tactile learners at a disadvantage (Barbe & Swassing, 1979).

There are strategies that teachers can use to help auditory, kinesthetic, and tactile learners succeed with the visual skill of reading. For kinesthetic learners, teachers can allow students to use their fingers to point to words as they read (Barbe & Swassing, 1979). Finger pointing helps them to focus on specific words or passages. For auditory learners teachers

can focus on word attack skills that rely on the sounds of letters. For example, phonics instruction is more helpful for auditory learners than the look-say method. Teachers should allow, and even encourage, auditory learners to move their lips when reading even though lip movement can slow down their reading.

Auditory, kinesthetic, and tactile learners may also have trouble reading because of the way they deal with imagery (Barbe & Swassing, 1979; Haggart, 2002). Many struggling readers have never pictured an event or setting in a book. Many have never used their imagination to put themselves into books by “talking, living, dressing, and thinking like a character” (Robb, 2000). If a teacher asks the class to close their eyes and picture a sunset, some students will not see anything. In *Reading is Seeing* (2004), Wilhelm describes a student, Scott, who did not see anything when he read, so Wilhelm had Scott work with graphic novels and picture books to understand how to make pictures in his head. Wilhelm had Scott draw pictures and maps to represent what he was reading. These kinesthetic activities helped Scott bridge the gap into visualizing what he was reading.

Studies on Learning Styles and Reading

Jill Olsen (1983) investigated the relationships between academic achievement and learning modalities in seventh grade students. The study compared the results of the subjects’ Swassing-Barbe Modality Index findings, a Stanford Achievement Test, and an Otis-Lennon School Ability Test. In her study, she defined *learning modality* as the ability to receive and process information through specific sensory input channels: visual, aural, and tactile. The results of the study showed that listening comprehension, reading comprehension, and using information related significantly to learning modality.

Roger Spires’ (1983) research looked at whether training teachers about learning

styles would affect reading and math achievement for students in kindergarten through sixth grade. The students in the study took a learning styles inventory to determine which learning style they preferred, and the teachers took a teaching style inventory that showed which preference they used while teaching. Their teachers used the results of these inventories to determine instructional methods that they could use to teach the students. This inventory showed that the higher-grade level teachers were more likely to use traditional teaching styles than the lower-grade level teachers. Throughout the year, the teachers learned different strategies that they could use for their instruction during in-service trainings and implemented the ideas in their classroom. Spires' study showed that the subjects achieved significantly more with word attack, reading comprehension, and mathematics concepts than the control group who were not taught using these strategies.

Linda Clemons' (1990) doctoral study examined the effects of multisensory instruction on the reading achievement of dyslexic and at-risk primary grade students. Clemons defined multisensory activities as those that include the stimulation of two or more modalities simultaneously or sequentially within a few minutes. Six first, second, and third grade classes were observed for a seven month period. The researchers observed the classrooms and recorded daily percentages of multisensory reading instruction and the modalities (visual, auditory, kinesthetic, and tactile) included in the multisensory activities. The research showed that increased sensory input improved the learning opportunities of dyslexic and at-risk students, and increased sensory input benefited almost all of the first through third grade students. Additionally, Clemons found that multisensory activities that increased kinesthetic involvement improved time-on-task and enjoyment in learning.

Sossie Djabrayan (1991) completed a master's thesis that examined the effects of a

multisensory program on the reading achievement of learning disabled high school students in a science class. For this study, the teachers taught thirteen subjects (seven in the experimental group, and six in the control group) the information in four chapters of their science text. The results of the study showed that while the experimental group did not score significantly higher than the control group on a reading recognition test, they did have significantly higher scores on the word definition test and the sentence use test. Also, both the experimental group and the control group showed increased interaction, which was one of the other factors in the study. Djabrayan's study indicated that a multisensory method could improve the reading achievement of learning disabled students.

Susanne Geoghegan (1996) completed a master's thesis in which she compared the learning styles of forty elementary level struggling readers. She used a test that showed four modalities: visual, auditory, kinesthetic, and tactile. Geoghegan's results found the kinesthetic and tactile combined were more than double the visual and auditory combined, so she concluded that the group was more kinesthetically inclined. For Geoghegan, teaching to students' modality was a "low risk-high benefit" choice. If the teacher provided more kinesthetic reading opportunities for students, these opportunities would never hurt the students but might help them to improve in reading.

Simpson and Yunfel (2004) examined the relationship between students' learning styles, class participation, and enjoyment levels. The authors used enjoyment levels as an indicator of student success. One hundred sixty nine online graduate students were the subjects for this study. Each of these subjects took Kolb's Learning-Style Inventory in a face to face training session. Near the end of the term each of the subjects reported their enjoyment and participation levels. The results showed that learning styles had a significant

impact on students' enjoyment levels in class.

Haver Crosley's (2007) doctoral study compared the effectiveness of multisensory classrooms and traditional classrooms for sixth, seventh, and eighth grade students. Crosley divided the 282 subjects into control and test groups. Each group took a pretest and the control group learned three units of science using traditional classroom techniques, while the test group learned the same three units of science using multisensory techniques. Next, both groups took a post-test. After that, Crosley switched the groups so that the control group learned the next science units using multisensory techniques while the sample group learned using traditional techniques. Again, both groups took a pretest and a posttest to assess learning. The results of this study showed that middle school students learned more and had a better attitude towards learning if they had multisensory classroom environments.

Holly Thompson (2007) studied the impacts of educational kinesiology on fourth graders' reading comprehension achievement. Educational Kinesiology, which is also known as Brain Gym, is a series of simple, enjoyable movements that involve the whole body to improve whole brain learning. Thompson's research had shown that kinesthetic activities make all types of learning easier and are especially effective with academic skills. During the study, the test group participated in seven to ten minutes of kinesiology activities before their reading lessons while the control group read silently. The results showed that educational kinesiology had a positive impact on reading comprehension in the areas of sequencing, main idea, supporting details, inference, and summarizing.

Lilia Burton's (2009) doctoral study attempted to identify factors in children's struggle to learn to read, identify interventions to help students improve, and determine the effectiveness of hands on manipulatives for these students. Ten second grade struggling

readers took a Phonemic Awareness Test as a pretest. Each day for three weeks, after the students' regular reading instruction time, they practiced phonemic awareness skills for 15 minutes. The students then used flashcards to practice their words for 15 more minutes. The results of this study showed that including kinesthetic and tactile manipulatives helped kindergarten children be more successful with phonics reading instruction.

Summary

This chapter reviewed the literature pertaining to reading and style to place this study in the perspective of past and current research practice. The chapter began with a review of the history of reading and showed the changes educators have made over the years as they have sought ways to help all students learn to read. Reading instruction has moved back and forth from phonics based, to meaning based, to combined methods as educators have searched for the “best” way to teach all students to read. With each change of strategy, some students learned to read, others struggled, and some failed to learn to read. History has shown that no one method has proven successful for helping every student learn to read. The second topic that this chapter introduced is Lexile, which is the measure that this research used to determine reading ability. Next, this chapter presented the topic of learning style, which is a preference for the way a person learns and remembers information. This research focuses on auditory, kinesthetic, tactile, and visual modality learning styles. Finally, the chapter introduced similar studies about reading and learning styles.

CHAPTER THREE: METHODOLOGY

This chapter explains the methods the researcher used to carry out this research study including a general description of the nature and research design of this study, the research context, the research participants and subjects involved in the study, the assessment instruments used in the collection of data, the procedures used to carry out the research design, and how the data were analyzed to answer the research questions. The purpose of this study was to determine whether there might be a relationship between any sensory learning style, as determined by The Kaleidoscope Profile, and reading comprehension, as determined by the Scholastic Reading Inventory (SRI). A sample of subjects from two schools (School A and School B) participated in this study. Each of the subjects took The Kaleidoscope Profile and the SRI to measure his or her learning style and reading comprehension level. This researcher compared the results from each of the instruments using different statistical procedures. These procedures include a Chi Square test for independence as well as an analysis of variance (ANOVA).

Research Design and Appropriateness

This study used a descriptive causal-comparative research design because this design provided the researcher with the ability to compare two variables with one another (Cozby, 2001). The independent variables were the reading levels of the subjects and the schools the subjects attend, and the dependent variables for this study were the learning styles of the subjects. This study is a comparative study because the variables in the study are categorical (ordinal or nominal). The comparative design allowed the researcher to compare one group of participants with another group of participants to determine whether there was a difference between the two with respect to certain measurements or characteristics. In this regard, the

groups that this study compared with one another were the struggling readers and on-grade-level readers as measured by the SRI. Comparing these students' scores will allow this study to show if there was a difference in learning styles as measured by The Kaleidoscope Profile.

The research design is quantitative because the study looked for a comparison between three variables (i.e. the subject's reading level as well as the subject's school and learning styles). The researcher is able to assign numerical values to the variables so that she can compare the data. Being able to assign numerical values to the variables in the study allows for the quantification of the results by using different statistical procedures. This method was appropriate for this study because other research has shown that The Kaleidoscope Profile and the SRI are valid and reliable tools to measure the learning styles of students and the reading levels of the students, respectively.

This causal-comparative design was appropriate for this study since the objective was to determine whether there were relationships or differences between the independent and dependent variables in the study. The quantitative research design was more appropriate than a qualitative design for the proposed study because with a qualitative design the researcher would not be able to assess a direct relationship between two variables as result of the open-ended questions because researchers must code the responses subjects provide to the open-ended questions and determine themes or trends in the responses (Cozby, 2001; Denzin & Lincoln, 2005). Similarly, because this study uses instruments that other researchers have used previously and have shown to be valid and reliable, this allows this study to quantify its results and findings.

Research Question and Hypotheses

The main research question that this study posed was the following:

Among seventh grade students in two suburban schools in Utah, what is the relationship between having a specific sensory learning style, as determined by The Kaleidoscope Profile, and having below-grade-level reading comprehension, as determined by the Scholastic Reading Inventory (SRI)?

To address the objectives, this study posed the following null hypotheses:

Null Hypothesis 1: There will not be a significant relationship between Lexile scores and sensory learning styles.

Null Hypothesis 2: When comparing struggling readers and on-grade-level readers, there will not be a significant difference in the distribution of specific sensory learning styles.

Null Hypothesis 3: When comparing School A and School B, there will not be a significant difference in the distribution of specific sensory learning styles.

Population and Sampling

Subjects. The subjects for this study were students enrolled in one of two different junior high schools located in a large suburban district in Utah. For confidentiality purposes, this study will refer to these two schools as School A and School B. The subjects from School A included all seventh grade students who attended School A at the time of the study. These included students who were in several different intervention reading programs including Read 180 and special education and students who were not in any reading programs. The subjects from School B included the seventh grade students enrolled in Read 180 and special education reading only. School A had a seventh grade population of 316, and School B had a seventh grade Read 180 and Special education population of 58, which means that this study drew from a total sample size of 373 possible subjects. Of these 373 possible subjects, 11 were missing scores from one or more of the two assessments, and 19

were missing parental permission, so that left 343 subjects; 298 were from School A, and 45 were from School B. The next section describes the demographics of schools A and B to encourage further research.

Demographics for Schools A and B. There are 14 junior high schools located within this district. Schools A and B are average size junior highs within this district. This study used these two specific schools because of their similarities in reading scores, size, mobility (which means how many students moved in and out of the school during the year), and percent of free and reduced lunch. Both schools have a higher percent of students qualifying for free and reduced lunch, more mobility, a larger number of readers below-grade-level, and a greater number of English Language Learners than most of the other schools in the district. Table 3.1 shows specific demographic details of the district and of schools A and B.

Sampling Plan. The researcher had all possible subjects take the SRI test. All who were in attendance on their class' assigned test day took The Kaleidoscope Profile, and all took permission slips home. After the assigned date for students to return permission slips, the researcher contacted the parents of the students who did not return the slips to obtain permission for additional subjects. The students used their district assigned ID numbers instead of their names to identify themselves when taking the tests. After this researcher collected and compiled the SRI, Kaleidoscope Profile, and permission data, erased all information from any subject who was missing data from either assessment or who did not have permission to participate in the study. Next, the researcher assigned new research numbers to the subjects and erased all district assigned ID numbers and all other identifying data.

Table 3.1: Demographics for the 2007-2008 School Year

	District	School A	School B
Total enrollment Oct 2007	14211	959	927
Female	48.27%	48.38%	47.90%
Male	51.73%	51.62%	52.10%
American Indian	0.61%	0.94%	1.94%
African American	1.45%	1.88%	3.34%
Asian	1.63%	1.88%	1.62%
Caucasian	85.98%	80.71%	68.72%
Hispanic	7.69%	12.30%	20.28%
Asian-Pacific Islander	0.89%	0.94%	0.97%
Other	1.75%	2.29%	2.27%
Limited English	5.76%	6.88%	14.99%
Percent free-reduced lunch	21.60%	32.6%	49.8%
Percent mobility	8.80%	12.0%	16.1%
Seventh grade reading on level	80.6%	74.4%	58.1%
Grade 8 IOWA reading percentile rankings 2005-2006	68	59	56
Grade 8 IOWA reading percentile rankings 2006-2007	66	54	54

(Davis School District, 2006)

This study used a convenience-sampling plan, which is a form of non-probability sampling, because the researcher was able to obtain more observations for the study in a shorter period of time (Urdan, 2005). The convenience-sampling plan is appropriate for this study since the study did not randomly select students from the entire population of currently

enrolled students, but selected them from the schools where this researcher obtained permission for the study.

Sample Size. When calculating the sample size for the study, this researcher considered three factors. The first factor was the power of the test. The power of the test measures the probability of rejecting a false null hypothesis and is usually set at 80% (Keuhl, 2000). For the purpose of this study, this researcher selected a power of 80% because a power of this magnitude adequately rejects a false null hypothesis (Moore & McCabe, 2006). The second factor was the effect size, which measures the strength of the relationship between the variables in the study (Cohen, 1988). Cohen (1988) determined that the effect size for tests can fall under three categories including a small effect (0.3-0.1), a moderate effect (0.5-.03), and a large effect (<0.5) (Hopkins, 2002). For the purpose of this study, the researcher selected a medium effect size since this effect size would provide evidence of a relationship between the independent and dependent variables without being too strict or too lenient. The final factor that was important was the level of significance. The level of significance is the probability of rejecting a true null hypothesis and is usually defined as being equal to five percent (Moore & McCabe, 2006). For this study, the researcher selected the level of significance to be equal to five percent since this is the level most consistently used.

The sample size also depended on the type of analysis that this study conducted. For the purpose of this study, the researcher used a Chi Square test for independence. In terms of the Chi Square test, the sample size also depends on the number of degrees of freedom. The degrees of freedom for the Chi Square test are equal to $(r - 1)(c - 1)$ where “ r ” is the number of rows and “ c ” is the number of columns in the contingency table. Based on this

information, the minimum sample size that would be required for this study would be 88. The Chi Square test was based on one degree of freedom, a medium effect, power of 80%, and level of significance of five percent. The program G*Power was used to calculate sample size estimations as this program can calculate sample sizes for several different statistical procedures including the Chi Square test listed above.

Instruments

This research used The Kaleidoscope Profile to measure the students' sensory learning styles and the Scholastic Reading Inventory (SRI) to measure the students' Lexile levels.

The Kaleidoscope Profile. The Kaleidoscope Profile is an instrument that measures the learning styles of individuals. The Kaleidoscope Profile can measure several different aspects or characteristics of the individuals who complete the profile including sensory styles (kinesthetic, tactile, auditory, or visual), perceptual and organizational styles (abstract, concrete, global, or sequential) and personality styles (intuitive feeler, intuitive thinker, sensing judger, or sensing perceiver) (Haggart, 2002). This study considered only the sensory learning style measurements because the author chose to focus on the theories of Barbe and Swassing and Dunn and Dunn.

After Bill Haggart designed The Kaleidoscope Profile, Performance Learning Systems (PLS) conducted two series of field tests to determine its validity (Haggart, 1998). During these field tests, PLS tested more than 1000 elementary students and 1000 secondary students from urban, rural, and inner city schools; 30-40% of the subjects were from minority groups. The researchers were looking at the external consistency with other instruments, external consistency with the general population, predictive validity, and internal

consistency.

Performance Learning Systems determined the predictive validity of The Kaleidoscope Profile by asking participants to assess the accuracy of the results. Table 3.2 shows the correlation between participants' views of themselves and The Kaleidoscope results.

Table 3.2: Correlation between The Kaleidoscope Profile and Self-Assessment

Trait	
Kinesthetic	.78
Tactual	.80
Auditory	.86
Visual	.88
Concrete Sequential	.67
Concrete Global	.89
Abstract Sequential	.91
Abstract Global	.73
Intuitive Feeling	.88
Intuitive Thinking	.79
Sensing Judging	.86
Sensing Perceiving	.79

(Haggart, 1998)

Performance Learning Systems determined the external consistency by having participants compare results of The Kaleidoscope Profile with various other self-reporting profiles including the Keirsey-Bates profile; Myers Briggs Type Indicator; Gregorc Style

Delineator; and Dunn, Dunn, and Price Learning Style Inventory (Haggart, 1998). The correlations from the first field test were .39 for Kinesthetic, .83 for Tactual, .23 for Visual, and .88 for Auditory. Because the correlation levels for some of the areas were unacceptable, Haggart reworked the profile and performed a second field test. Haggart reworked the questions eliminating unpopular choices, limiting choices for the more popular phrases, and changing wording. The second field-test, showed correlation coefficients for all traits in all categories at or above the .70-.80 relational target reliability. Table 3.3 shows the correlative coefficients between these profiles and The Kaleidoscope Profile.

Table 3.3: Correlation of Revised Kaleidoscope Profile to Other Instruments.

Trait	1 st field test	2 nd field test
Kinesthetic	.38	.78
Tactual	.83	.89
Visual	.23	.72
Auditory	.88	.91
Concrete Sequential	.86	.89
Concrete Global	.95	.97
Abstract Sequential	.86	.89
Abstract Global	.45	.90
Intuitive Feeling	.67	.92
Intuitive Thinking	.88	.90
Sensing Judging	.29	.81
Sensing Perceiving	.25	.77

(Haggart, 1998)

Finally, Performance Learning Systems compared the results of the profile with the expected trait populations for the public to determine the external consistency with the general population (Haggart, 1998). Table 3.4 shows the results.

Table 3.4: Kaleidoscope Profile and General Population Percentages Comparisons

Trait	Field test of Kaleidoscope Profile	Expected percentages for general population
Kinesthetic	32	35
Tactual	20	20
Visual	11	10
Auditory	30	35
Concrete Sequential	26	30
Concrete Global	63	70
Abstract Sequential	48	50
Abstract Global	42	50
Intuitive Feeling	14	12
Intuitive Thinking	14	12
Sensing Judging	32	38
Sensing Perceiving	39	38

(Haggart, 1998)

Stafford (2004) used The Kaleidoscope Profile to examine the learning styles of high school students and teachers at a vocational school in Caroline County, Maryland. She was looking at the relationships between learning styles and grades earned on the end-of-course exams in English and geometry. Her results showed that the teachers had similar percentages

of the learning styles to the percentages predicted by the previous research by Guild and Ulrich (1986) and Keirsey and Bates (1984). In addition, the vocational students had similar percentages of learning styles as predicted: 2.5% auditory, 56.8% kinesthetic, 8.6% tactile, 7.4% visual, and 24.7% had no preference. Half of the vocational students preferred kinesthetic learning, which is consistent with J. Fleming's 1989 research that showed that vocational students were highly kinesthetic learners with a secondary preference for tactile learning styles.

After a person takes the online version of The Kaleidoscope Profile, the program gives him or her numerical scores indicating the strength of each of the twelve traits and an explanation of those traits. For each of the scores, a higher number represents a stronger indication of that trait (Haggart, 2002). For the purposes of this study, this researcher categorized the subjects' Kaleidoscope Profile scores to determine the strength of the learning style preference. For each of the four traits, kinesthetic, tactile, auditory, and visual, this researcher divided the range of the scores into four sections representing a very strong, a strong, a mild, and a weak indication of the trait. Table 3.5 shows the range chosen for each of the categories.

Table 3.5: Categories for Learning Styles Using Data from Kaleidoscope Profile

	Kinesthetic	Tactile	Auditory	Visual
Very Strong	12+	11+	9+	8+
Strong	8-11	8-10	6-8	6-7
Mild	5-7	5-7	4-5	4-5
Weak	0-4	0-4	0-3	0-3

Scholastic Reading Inventory. The Scholastic Reading Inventory (SRI) is an instrument used to measure the reading comprehension levels of students. Scholastic field-tested the print-based version of the Scholastic Reading Inventory (SRI) using over 100,000 students (Scholastic, 2005). The online version was field tested and validated by comparing it to the print-based version and to other nationally recognized tests of reading comprehension including the Comprehensive Test of Basic Skills, North Carolina End-of-Grade Test of Reading Comprehension, and the Pinellas Instructional Assessment Program. The reading skills specifically targeted by the SRI are identifying details, drawing conclusions, and making comparisons.

Scholastic determined the content validity of the SRI test by test-retest on the passages and item format used on the test (Scholastic, 2005). The SRI uses passages from textbooks, literature, magazines, and newspapers. The topics come from a variety of interest areas. Each passage is a complete piece of information that develops one main idea. A student does not need any prior information to understand a passage.

One of the ways that Scholastic tested construct validity was by examining the SRI against several measures including expected developmental changes in test scores and correlation with similar tests that measure reading comprehension (Scholastic, 2005). Because reading comprehension is a developmental construct, a student's score on any reading comprehension test should increase as his or her grade level increases. Scholastic conducted one study with students in grades kindergarten to five and one with students in grades four to nine to determine the amount of growth expected. The results showed that when there is sufficient time and instruction between test administrations, SRI scores should go up. Table 3.6 shows the expected correlation between *SRI Lexile levels* and *grade levels*.

In the table, *At Risk* means that the student does not demonstrate minimally competent performance when reading grade level texts; *Basic* means that the student exhibits minimally competent performance with grade level texts; *Proficient* means that the student exhibits competent performance with grade level texts and can identify details, draw conclusions, and make comparisons and generalizations; and *Advanced* means that the student exhibits superior performance when reading grade level texts.

Table 3.6: SRI Lexile Levels and Grade Levels

Grade	At Risk	Basic	Proficient	Advanced
1	NA	99 and below	100-400	401 and Above
2	99 and Below	100-299	300-600	601 and Above
3	249 and Below	250-499	500-800	801 and Above
4	349 and Below	350-599	600-900	901 and Above
5	449 and Below	450-699	700-1000	1001 and Above
6	499 and Below	500-799	800-1050	1051 and Above
7	549 and Below	550-849	850-1100	1101 and Above
8	599 and Below	600-899	900-1050	1151 and Above
9	649 and Below	650-999	1000-1200	1201 and Above
10	699 and Below	700-1024	1025-1250	1251 and Above
11	799 and Below	800-1049	1050-1300	1301 and Above

(Scholastic, 2005)

In addition to checking the construct validity in each item, the Scholastic compared students' scores on other standardized reading comprehension tests with their SRI Lexile scores (Scholastic, 2001). The SRI scores showed a correlation with the scores on the

Comprehensive Test of Basic Skills (CTBS), the North Carolina End-of-Grade Test (NCEOG), and the Stanford Achievement Test (SAT8).

Scholastic determined the criterion-referenced validity by comparing students' forecasted comprehension, performance standards, and norm-referenced results (Scholastic, 2005). MetaMetrics created the Lexile Framework so that a student will comprehend texts on his or her Lexile with 75% accuracy (MetaMetrics, 2006). Scholastic used the Lexile Framework in creating the SRI test bank. In addition, each test item has scaled scores that show the expected difficulty of the item. Scholastic used these scaled scores during the field test to determine the correlation of the expected comprehension with the test score to show criterion-referenced validity.

Scholastic used 512,224 students from a medium-large state that had means and standard deviations similar to the nation to norm the SRI test (Scholastic, 2001). The normative SRI scores are percentile rank, Normal Curve Equivalent (NCE), and stanines. Percentile rank scores and NCE scores both run between one and ninety-nine and have a fixed mean of fifty. Percentile rank scores show the percentage of students who had a lower score than the person testing. NCE scores show where a student falls along the normal curve. Stanine scores run between one and nine and have a fixed mean of five and a standard deviation of two (Monetti & Hinkle, 2005). Graph 3.1 shows the relationship between these three types of scores.

The SRI test gives Lexile scores between 0 and 1500 (Scholastic, 2001). Grade level for a seventh grader is between 850L and 1100L. This study uses five categories of reading comprehension based on the scale recommended by Scholastic. Table 3.7 shows the Lexile scores for each reading comprehension category.

Graph 3.1: Relationship of Stanines, Percentile Ranks, and Normal Curve Equivalent

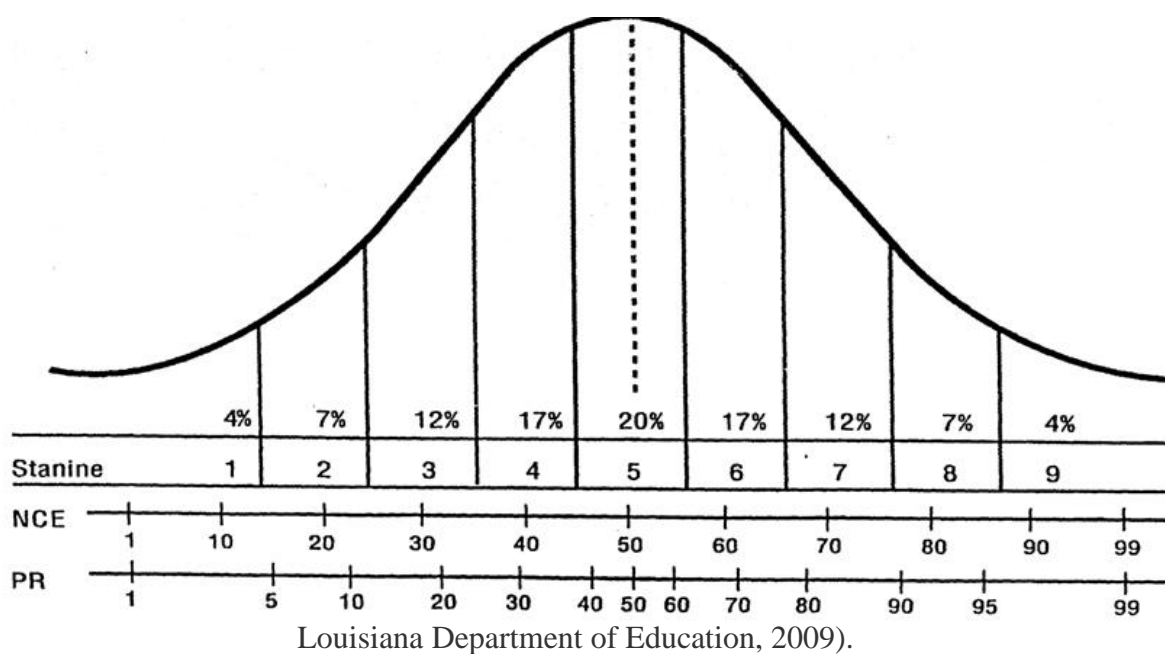


Table 3.7: SRI Categories for Reading Comprehension

	Lexile Scores
Beginning reader	0-100
Far-below-grade-level	101 – 549
Below-grade-level	550-849
On-grade-level	850-1100
Above-grade-level	1101-1500

(Scholastic, 2001)

Data Collection

The researcher had all the students take permission slips home. Included on the permission slip form was a space for the parents to indicate if they agreed to allow their child to participate in the study. The permission form asked the parent or guardian to sign the

signature line and indicate either permission given or denied by checking a marked box.

After the permission slip deadline passed, the researcher contacted the parents of the students who did not return the slips to attempt to increase the number who granted permission to use their children in the study. The researcher excluded the data for anyone for whom she was unable to obtain parental or guardian permission.

After receiving permissions, the researcher then imported the raw data from the computerized tests into Microsoft Excel for future analyses. The researcher assigned each row of the data a unique identification number to specify which responses correspond to which participants in the study, printed a hard copy which showed which participant was assigned which number, and erased the all identifying information except for the unique identifier from the spreadsheet. Next, the researcher stored the hard copy in a locked filing cabinet, which only the researcher can access, and she stored the Excel spreadsheet in a password-protected file on the computer. By doing assigning research identification numbers, the researcher protected the confidentiality of each participant in the study so that no personal information will be accessible to anyone except for the researcher. The researcher will keep a copy of the data on file for a period of three years. After that, the researcher will destroy the hard copy and delete the spreadsheets from the hard drive.

Data Analysis

The data analysis that the researcher used in this study was comprised of summary statistics, Chi Square analysis, and analysis of variance (ANOVA). The researcher used SPSS Version 16.0® to conduct each of these analyses.

Because this study was looking at how frequently specific sensory learning styles occur within struggling readers and comparing that frequency with how often specific

sensory learning styles occur in on-grade-level readers, the statistical procedure this researcher used was the Chi Square test for independence. The researcher ran a Chi Square test for independence to see if any of the specific learning styles occur more frequently in the struggling reader group. If the answer was yes, and there was a big enough sample size, the researcher would try to match students in specific reading classes. The researcher conducted additional Chi Square tests for independence to see if specific learning styles occurred more frequently in the struggling reader group. If there were not enough cases to match successfully on all four factors, the researcher used ANOVA to compare each of the reading levels and schools separately.

The Chi Square test for independence determines if there was a significant relationship or difference between two variables that are categorical in nature (Moore & McCabe, 2006). Then a cross-tabulation or contingency table would be created for the categorical variables to indicate the frequency with which the corresponding categories of the categorical variables occur together. If there were a significant relationship between the two variables, then this significance would indicate that the variables are not independent of one another, while a non-significant relationship between the variables would indicate that the variables are independent of one another. The variables for this study consisted of the students' learning styles, reading levels, and schools.

ANOVA determines whether single or multiple categorical variables significantly explain the variation in a continuous dependent variable (Moore & McCabe, 2006). If there were a significant relationship between the independent variable(s) and the dependent variable, this significance would indicate that the independent variable(s) significantly explain the variation in the dependent variable. The researcher used an ANOVA to compare

the kinesthetic, tactile, auditory, and visual learning style scores of The Kaleidoscope Profile with those students from School A and School B as well as students with different reading levels.

If the ANOVA found that there was a significant relationship between the independent and dependent variables, then a post hoc test could determine which categories of the independent variables significantly differed from one another with respect to the average scores of the dependent variable observed for each category. The post hoc test that this study used was based on a t-statistic from the t-distribution. Therefore, depending on the sign and magnitude of the test statistic, the post hoc test would indicate whether one group of students scored significantly higher than the other group of students when comparing the kinesthetic, tactile, auditory, and visual learning style scores of the students.

Summary

Chapter Three discussed the research methodology that this researcher employed in the current study: quantitative comparative research design. Also included in Chapter Three was information on the data collection process as well the proposed statistical analyses, which include a Chi Square test and an ANOVA. Also presented in this chapter were the appropriateness of the research design, the proposed hypotheses, the population, and sample size. The following chapter presents the results for this study.

CHAPTER FOUR: RESULTS OF THE STUDY

This study's objective was to determine whether there might be a relationship between sensory learning styles and reading comprehension levels. The study sought to answer the question: Among seventh grade students in two suburban schools in Utah, what is the relationship between having a specific sensory learning style, as determined by The Kaleidoscope Profile, and having below-grade-level reading comprehension, as determined by The Scholastic Reading Inventory (SRI)? In order to answer this question, the researcher defined the following three null hypotheses. *Null Hypothesis 1: There will not be a significant relationship between Lexile scores and sensory learning styles. Null Hypothesis 2: When comparing struggling readers and on-grade-level readers, there will not be a significant difference in the distribution of specific sensory learning styles. Null Hypothesis 3: When comparing School A and School B, there will not be a significant difference in the distribution of specific sensory learning styles.*

The data used to test these hypotheses included Lexile scores from the subjects' first SRI test of the school year and the scores from The Kaleidoscope Profile (that the subjects took as part of their participation in this study). To address the objectives, this researcher conducted Chi Square tests for independence, Analysis of Variance (ANOVA), and post hoc tests with the data. This chapter presents the findings of those analyses beginning with a section describing the data and study variables, continues with a presentation of the results for each of the hypothesis questions, and concludes with a summary of the findings.

Description of the Data and the Study Variables

Subjects. Three-hundred forty-three students enrolled in two different junior high schools located in a large suburban district in Utah were the subjects of this study. School

A's 298 subjects included all seventh grade students who had parental permission, and School B's 45 subjects included only the students who had parental permission and were enrolled in two reading programs for struggling readers: Read 180 and Special Ed Reading.

Table 4.1 presents the frequency counts and percentages for the subjects.

Table 4.1: Frequency Counts and Percentages for subjects (N = 343)

	Number of subjects	Percentage
School A	298	86.88
School B	45	13.12
Total	343	100

Mean, Minimum, Maximum, and quantiles of the data. Before running the Chi Square, ANOVA, and post hoc tests on the data, this researcher determined the mean, minimum, maximum, 5%, 25%, 50%, 75%, and 95% quantiles of The Kaleidoscope Profile traits, kinesthetic, tactile, auditory, and visual, as well as the Lexile scores. Table 4.2 presents that information.

Sensory Learning Styles. As stated in Chapter Three, the researcher divided the range of The Kaleidoscope Profile traits, kinesthetic, tactile, auditory, and visual, into four categories: very strong, strong, mild, and weak. Table 4.3 to Table 4.6 present the frequency counts and percentages for each of the categories for these four traits, respectively.

Lexile. Each of the subjects took the SRI to determine their reading comprehension level. The SRI test results are Lexile scores between 0 and 1500 (Scholastic, 2001). Based on the Lexile Framework and the expected Lexile range of seventh grade students, the researcher divided the subjects' Lexile scores into five categories: beginning reader, far-

below-grade-level, below-grade-level, on-grade-level, and above-grade-level (Metametrics, 2008c: Scholastic, 2003). Table 4.7 presents the frequency counts and percentages for each of the categories.

Table 4.2: Descriptive Statistics for Study Variables

	Mean	Min	Max	P5	P25	P50	P75	P95
School A								
Kinesthetic	9.3	0	23	5	7	9	11	15
Tactile	8.1	1	19	4	6	8	10	13
Auditory	6.1	0	12	2	4	6	8	10
Visual	5.2	0	12	2	4	5	6	9
Lexile Scores	961.8	0	1473	397	787	1006.5	1196	1362
School B								
Kinesthetic	7.6	1	14	2	5	7	11	13
Tactile	7.3	0	14	2	5	8	10	12
Auditory	4.4	0	9	1	3	4	6	8
Visual	4.0	0	8	1	3	4	5	8
Lexile Scores	523.8	0	975	0	430	525	754	918
Overall								
Kinesthetic	9.1	0	23	4	7	9	11	14
Tactile	9.0	0	19	4	6	8	10	13
Auditory	5.9	0	12	2	4	6	8	10
Visual	5.0	0	12	2	4	5	6	9
Lexile Scores	904.3	0	1473	306	686	951	1156	1351

Table 4.3: Frequency Counts and Percentages for Kinesthetic Group

	School A	School A	School B	School B	Overall	Overall
	Subjects	Percentage	Subjects	Percentage	Subjects	Percentage
Very Strong	72	24.16	8	17.78	80	23.32
Strong	145	48.66	14	31.11	159	46.36
Mild	69	23.15	14	31.11	83	24.20
Weak	12	4.03	9	20	21	6.12

Table 4.4: Frequency Counts and Percentages for Tactile Group

	School A	School A	School B	School B	Overall	Overall
	Subjects	Percentage	Subjects	Percentage	Subjects	Percentage
Very Strong	46	15.44	8	17.78	54	15.74
Strong	139	46.64	15	33.33	154	44.90
Mild	87	29.19	11	24.44	98	28.57
Weak	26	8.72	11	24.44	37	10.79

Table 4.5: Frequency Counts and Percentages for Auditory Group

	School A	School A	School B	School B	Overall	Overall
	Subjects	Percentage	Subjects	Percentage	Subjects	Percentage
Very Strong	47	15.77	2	4.44	49	14.29
Strong	125	41.95	13	28.89	138	40.23
Mild	93	31.21	14	31.11	107	31.20
Weak	33	11.07	16	35.56	49	14.29

Table 4.6: Frequency Counts and Percentages for Visual Group

	School A	School A	School B	School B	Overall	Overall
	Subjects	Percentage	Subjects	Percentage	Subjects	Percentage
Very Strong	36	12.08	3	6.67	39	11.37
Strong	79	26.51	8	17.78	87	25.36
Mild	124	41.61	17	37.78	141	41.11
Weak	59	19.80	17	37.78	76	22.16

Table 4.7: Frequency Counts and Percentages for Lexile Scores Group

	School A	School A	School B	School B	Overall	Overall
	Subjects	Percentage	Subjects	Percentage	Subjects	Percentage
Beginning Reader	36	12.08	3	6.67	39	11.37
Far-below-grade-level	79	26.51	8	17.78	87	25.36
Below-grade-level	124	41.61	17	37.78	141	41.11
On-grade-level	59	19.80	17	37.78	76	22.16

After putting the data into the descriptive tables, the researcher ran the Chi Square, ANOVA, and post hoc tests for each of the three hypotheses.

Hypothesis 1

Null Hypothesis 1: There will not be a significant relationship between Lexile scores and sensory learning styles.

A Chi Square analysis was conducted to see if there was a significant relationship or difference between any of the specific learning styles and reading comprehension. Table 4.8a and Table 4.8b present the Chi Square test findings of the kinesthetic group. The Chi Square was 37.6 with 12 Degrees of Freedom and a p value of <0.001 , which indicates that there is a significant relationship between the kinesthetic learning style and reading comprehension. Table 4.9a and Table 4.9b present the Chi Square findings for the tactile group. The Chi Square value was 3.75 with 12 Degrees of Freedom and a p value of 0.99, which indicates that there is no significant relationship between the tactile learning style and reading comprehension. Table 4.10a and Table 4.10b present the Chi Square findings for the auditory group. The Chi Square value was 32.84 with 12 Degrees of Freedom and a p value of 0.001, , which indicates that there is a significant relationship between the auditory learning style and reading comprehension. Table 4.11a and Table 4.11b present the Chi Square findings for the visual group. The Chi Square value was 22.08 with 12 degrees of Freedom and a p value of 0.037, which indicates that there is a significant relationship between the visual learning style and reading comprehension. The findings of Table 4.8a to Table 4.11b indicate there was a significant relationship between the kinesthetic, auditory, and visual learning style of The Kaleidoscope Profile and the Reading Level. Table 4.12 combines these findings into one chart that shows the Chi Square findings for all four learning styles.

Table 4.8a: Contingency Table of Kinesthetic Group by Reading Comprehension

		Beginning Reader	Far- below- grade- level	Below- grade- level	On- grade- level	Above- grade- level	Total
Very Strong	Observed	0	11	19	23	27	80
	Expected	1.9	10.7	18.9	23.3	25.2	80.0
Strong	Observed	1	17	43	47	51	159
	Expected	3.7	21.3	37.5	46.4	50.1	159.0
Mild	Observed	3	14	15	23	28	83
	Expected	1.9	11.1	19.6	24.2	26.1	83.0
Weak	Observed	4	4	4	7	2	21
	Expected	.5	2.8	5.0	6.1	6.6	21.0
Total	Observed	8	46	81	100	108	343
	Expected	8.0	46.0	81.0	100.0	108.0	343.0

Table 4.8b: Findings of Chi Square Test for Kinesthetic Group and Reading Comprehension

Chi Square	DF	p-Value
37.46	12	< 0.001

Table 4.9a: Contingency Table of Tactile Group by Reading Comprehension

		Far-					Total
		beginning	below-	Below-	On-	Above-	
		Reader	grade-	grade-	grade-	grade-	
			level	level	level	level	
Very Strong	Observed	1	6	15	15	17	54
	Expected	1.3	7.2	12.8	15.7	17.0	54.0
Strong	Observed	3	22	36	46	47	154
	Expected	3.6	20.7	36.4	44.9	48.5	154.0
Mild	Observed	4	12	21	29	32	98
	Expected	2.3	13.1	23.1	28.6	30.9	98.0
Weak	Observed	0	6	9	10	12	37
	Expected	.9	5.0	8.7	10.8	11.7	37.0
Total	Observed	8	46	81	100	108	343
	Expected	8.0	46.0	81.0	100.0	108.0	343.0

Table 4.9b: Findings of Chi Square Test for Tactile Group and Reading Comprehension

Chi Square	DF	p-Value
3.75	12	0.99

Table 4.10a: Contingency Table of Auditory Group by Reading Comprehension

		Far-					Total
		Beginning	below- grade-	Below- grade-	On- grade-	Above- grade-	
		Reader	level	level	level	level	
Very Strong	Observed	0	2	8	20	19	49
	Expected	1.1	6.6	11.6	14.3	15.4	49.0
Strong	Observed	1	17	29	45	46	138
	Expected	3.2	18.5	32.6	40.2	43.5	138.0
Mild	Observed	2	18	30	23	34	107
	Expected	2.5	14.3	25.3	31.2	33.7	107.0
Weak	Observed	5	9	14	12	9	49
	Expected	1.1	6.6	11.6	14.3	15.4	49.0
Total	Observed	8	46	81	100	108	343
	Expected	8.0	46.0	81.0	100.0	108.0	343.0

Table 4.10b: Findings of Chi Square Test for Auditory Group and Reading Comprehension

Chi Square	DF	p-Value
32.84	12	0.001

Table 4.11a: Contingency Table of Visual Group by Reading Comprehension

		Far-					Total
		beginning	below-	Below-	On-	Above-	
		Reader	grade-	grade-	grade-	grade-	
			level	level	level	level	
Very Strong	Observed	0	5	12	10	12	39
	Expected	.9	5.2	9.2	11.4	12.3	39.0
Strong	Observed	1	9	25	22	30	87
	Expected	2.0	11.7	20.5	25.4	27.4	87.0
Mild	Observed	1	20	26	44	50	141
	Expected	3.3	18.9	33.3	41.1	44.4	141.0
Weak	Observed	6	12	18	24	16	76
	Expected	1.8	10.2	17.9	22.2	23.9	76.0
Total	Observed	8	46	81	100	108	343
	Expected	8.0	46.0	81.0	100.0	108.0	343.0

Table 4.11b: Findings of Chi Square Test for Visual Group and Reading Comprehension

Chi Square	DF	p-Value
22.08	12	0.037

Table 4.12: Findings of Chi Square Tests for Sensory Learning Styles and Reading Comprehension

Learning Style	Chi Square	DF	P-Value
Kinesthetic	37.46	12	<0.001
Tactile	3.75	12	0.99
Auditory	32.84	12	0.001
Visual	22.08	12	0.037

These results fail to reject *Null Hypothesis 1* for the tactile learning style because there is not a significant relationship, and the results reject *Null Hypothesis 1* for the kinesthetic, auditory, and visual learning styles as there is a significant relationship.

Hypothesis 2

Null Hypothesis 2: When comparing struggling readers and on-grade-level readers, there will not be a significant difference in the distribution of specific sensory learning styles.

To see if any of the specific learning styles occurred more frequently in the struggling reader group, the researcher divided the subjects into struggling-readers (Lexile score 0 - 849) and on-grade-readers or above-grade-readers (Lexile score 850 - 1500). Then, the researcher ran an additional Chi Square test for independence. Because the tactile group did not show any significant relationship in *Hypothesis 1*, the tactile group was excluded from this Chi Square test. The Degrees of Freedom for this test set were three. The kinesthetic group had a Chi Square value of 2.99 with a p value of 0.394, the auditory group had a Chi Square value of 17.93 with a p value of <0.001, and the visual group had a Chi Square value of 4.51 with a p value of 0.212. These data show that for these subjects the auditory learning

style occurred less frequently in the struggling reader group. Tables 4.12a and 4.12b present these findings.

Table 4.12a: Contingency Table for Learning Style and Struggling Reader Group

		Type of Reader			
		Struggling	On-and above-Grade- level	Total	
Kinesthetic	Very Strong	Observed	30	50	80
		Expected	31.5	48.5	80.0
	Strong	Observed	61	98	159
		Expected	62.6	96.4	159.0
	Mild	Observed	32	51	83
		Expected	32.7	50.3	83.0
	Weak	Observed	12	9	21
		Expected	8.3	12.7	21.0
Total		Observed	135	208	343
		Expected	135.0	208.0	343.0
Auditory	Very Strong	Observed	10	39	49
		Expected	19.3	29.7	49.0
	Strong	Observed	47	91	138
		Expected	54.3	83.7	138.0
	Mild	Observed	50	57	107
		Expected	42.1	64.9	107.0

Auditory	Weak	Observed	28	21	49
		Expected	19.3	29.7	49.0
Total		Observed	135	208	343
		Expected	135.0	208.0	343.0
Type of Reader					
			Struggling	Above-Grade	Total
Visual	Very Strong	Observed	17	22	39
		Expected	15.3	23.7	39.0
	Strong	Observed	35	52	87
		Expected	34.2	52.8	87.0
	Mild	Observed	47	94	141
		Expected	55.5	85.5	141.0
	Weak	Observed	36	40	76
		Expected	29.9	46.1	76.0
Total		Observed	135	208	343
		Expected	135.0	208.0	343.0

Table 4.12b: Findings of Chi Square Test for Learning Style and Struggling Reader Group

Variable	Chi Square	DF	p-Value
Kinesthetic	2.99	3	0.394
Auditory	17.93	3	< .001
Visual	4.51	3	0.212

The researcher completed an ANOVA to compare the learning style scores of subjects whose reading comprehension was below-grade-level with the learning style scores of subjects whose reading comprehension was on or above-grade-level. The Degrees of Freedom for this test were four with an error of 338. The ANOVA showed that when comparing different reading levels, there was a significantly different distribution of kinesthetic learning styles with an f of 4.65 and a p of .001. There was also a significantly different distribution of auditory learning styles with an f of 6.81 and a p value of $< .001$. Finally, the visual learning style also had a significantly different distribution with an f of 3.00 and a p value of .019. Table 4.13 presents these findings.

Table 4.13: ANOVA Results for The Kaleidoscope Profile Learning Style Scores and Reading Levels

Variable	DF	F	p-Value
Kinesthetic	4	4.65	.001
Tactile	4	.31	.868
Auditory	4	6.81	$< .001$
Visual	4	3.00	.019
Error	338		

Finally, the researcher conducted a post hoc test to determine which categories of learning styles were different when comparing the struggling reader subjects and the on or above-grade-level subjects. The post hoc test that this study used was based on a two-sample t -test, with assumption of equal variance (all p -Values of the F -test of equal variance are greater than .05). The findings in Table 4.14 show that struggling readers scored

significantly lower than on or above-grade-level readers in auditory learning style scores, while the differences in kinesthetic, tactile, and visual learning style scores were not significant. Table 4.16 presents the findings of the post hoc test.

Table 4.14: Results of the Post Hoc Test for Struggling Reader Group

Variable	DF	T	p-Value
Kinesthetic	341	-1.57	.11
Auditory	341	-4.55	< .001
Tactile	341	.30	.767
Visual	341	-0.85	.395

These results reject *Hypothesis 2* for the kinesthetic, tactile and auditory learning styles. The most significant relationship was the auditory category, which showed a significant difference when comparing subjects with below-grade-level comprehension to students with on or above-grade-level comprehension. The struggling readers were much less likely to be auditory learners.

Hypothesis 3

Null Hypothesis 3: When comparing School A and School B, there will not be a significant difference in the distribution of specific sensory learning styles.

School A includes the entire 7th grade population as a norm and School B includes 7th graders defined as reading below-grade-level by their class placement.

The findings in Table 4.2 presented above indicated that the average kinesthetic, tactile, auditory, and visual learning style scores of The Kaleidoscope Profile for students

from School A and School B are different. The mean kinesthetic score at School A was a 9.3 while the mean kinesthetic score at School B was 7.6. The mean tactile score at School A was 8.1 while the mean tactile score at School B was 7.3. The mean auditory score at School A was 6.1 while the mean auditory score at School B was 4.4. The mean visual score at School A was 5.2 while the mean visual score at School B was 4.0.

The findings in Tables 4.3 through Tables 4.6 presented above indicated that there was a difference in the very strong, strong, mild, and weak frequencies of each of the four learning styles in School A and School B. For the kinesthetic group, there were more subjects in the very strong (6.38%) and strong (17.55%) categories in School A than in School B, but there were more subjects in the mild (7.96%) and weak (15.97%) categories in School B than in School A. For the tactile group, there were more subjects in the strong (13.31%) and mild (4.75%) categories in School A than in School B, but there were more subjects in the very strong (2.34%) and weak (15.72%) categories in School B than in School A. For the auditory group, there were more subjects in the very strong (11.33%) and strong (13.06%) categories in School A than in School B, but there were more subjects in the weak (24.49%) category in School B than in School A. For the visual group, there were more subjects in the very strong (5.41%), strong (8.73%), and mild (3.87%) categories in School A than in School B, but there were more subjects in the weak (17.98%) category in School B than in School A. Table 4.15 presents a comparison of the percentages of subjects within the categories (very strong, strong, mild, and weak) of the sensory learning styles in School A and School B.

The researcher used an ANOVA to compare the kinesthetic, tactile, auditory, and visual learning style scores of The Kaleidoscope Profile between those students from School

A and School B. In each of the findings below, there was one degree of freedom with an error of 341. The findings revealed that when comparing School A and School B, there is a

Table 4.15: Comparison of Percentages for Categories of Learning Styles between School A and School B

	School A	School B	
	Percentage	Percentage	Difference
Kinesthetic Very Strong	24.16	17.78	6.38
Kinesthetic Strong	48.66	31.11	17.55
Kinesthetic Mild	23.15	31.11	-7.96
Kinesthetic Weak	4.03	20	-15.97
Tactile Very Strong	15.44	17.78	-2.34
Tactile Strong	46.64	33.33	13.31
Tactile Mild	29.19	24.44	4.75
Tactile Weak	8.72	24.44	-15.72
Auditory Very Strong	15.77	4.44	11.33
Auditory Strong	41.95	28.89	13.06
Auditory Mild	31.21	31.11	0.1
Auditory Weak	11.07	35.56	-24.49
Visual Very Strong	12.08	6.67	5.41
Visual Strong	26.51	17.78	8.73
Visual Mild	41.61	37.78	3.83
Visual Weak	19.8	37.78	-17.98

significantly different distribution of kinesthetic learning style scores with an f of 11.26 and a p value of $< .001$. Tactile learning style scores also had a significantly different distribution of tactile learning style scores with an f of 3.10 and a p value of .079. Auditory learning style scores had a significantly different distribution between the two schools with an f of 21.75 and a p value of $< .001$. Finally, visual learning style scores had a significantly different distribution with an f value of 12.85 and a p value of .001. Table 4.16 presents those findings.

Table 4.16: ANOVA Results for The Kaleidoscope Profile Learning Style Scores and School

Variable	DF	F	p-Value
Kinesthetic	1	11.26	$< .001$
Tactile	1	3.10	.079
Auditory	1	21.75	$< .001$
Visual	1	12.85	$< .001$
Error	341		

Finally, the researcher conducted a post hoc test to determine which categories of the independent variable of School significantly differed from one another with respect to the average scores of the dependent variable observed for each category. The post hoc test that this study used was based on a two-sample t -test, with assumption of equal variance (all p -Values of the F -test of equal variance are greater than .05). Table 4.17 presents the findings, which reveal that students from School A scored significantly higher than the students from School B in the kinesthetic, tactile, auditory, and visual learning style scores.

Thus, *Hypothesis 3* was rejected as there is a significant difference in distribution in

all four categories between the two schools.

Table 4.17: Results of the Post Hoc Test for School

Variable	DF	T	p-Value
Kinesthetic	341	3.35	.001
Tactile	341	1.76	.079
Auditory	341	4.66	< .001
Visual	341	3.59	< .001

Summary

Chapter Four presented the results for this study. These results show that *Null Hypothesis 1* was rejected because the findings of Chi Square Test for Independence indicated that there was a significant relationship between the kinesthetic, auditory, and visual learning styles of The Kaleidoscope Profile and the Reading Level. *Null Hypothesis 2* was rejected because the ANOVA showed that when comparing different reading levels, there is a significantly different distribution of kinesthetic ($F(4, 338) = 4.65, p = .001$), auditory ($F(4, 338) = 6.81, p < .001$), and visual ($F(4, 338) = 3.00, p = .019$) learning style scores. In addition, the post hoc test revealed that the struggling reading group scored significantly lower in the auditory learning style when compared to the on or above-grade-level group. *Null Hypothesis 3* was rejected because the ANOVA reveal that when comparing School A and School B, there is a significantly different distribution of kinesthetic ($F(1, 341) = 11.26, p < .001$), tactile ($F(1, 341) = 3.10, p = .079$), auditory ($F(1, 341) = 21.75, p < .001$), and visual ($F(1, 341) = 12.85, p < .001$) learning style scores of The Kaleidoscope Profile. In addition, the post hoc test showed that subjects from School A

scored significantly higher in kinesthetic, tactile, auditory, and visual learning style scores than the subjects in School B.

In the following chapter, the researcher will provide a discussion of the findings and recommendations for additional research.

CHAPTER FIVE: SUMMARY AND DISCUSSION

Experts have been debating the “best” way to teach reading for many years, but despite all the efforts researchers, educators, and parents put into reading instruction, research shows that students continue to fail; in 2007, only 29% scored at or above proficient level according to *The Nation's Report Card: Reading 2007* (Lee, Grigg, & Donahue, 2007). This study investigated the relationship between sensory learning styles and reading comprehension levels among 7th grade students in two suburban schools in Utah. This chapter restates the research problem, reviews the methodology, summarizes and discusses the results, and provides suggestions for implications and further research.

Restatement of the Problem

This study was a descriptive causal-comparison of variables to determine if there could be a relationship between any specific sensory learning style and reading comprehension ability. If there is a relationship, reading teachers could create lessons, strategies, and techniques around those learning styles to help with the remediation of the struggling reading group and perhaps even incorporate these into the elementary level to help prevent the next group of readers from becoming struggling readers. The study compared the learning styles of subjects with their reading comprehension levels to attempt to answer the following question: among seventh grade students in two suburban schools in Utah, what is the relationship between having a specific sensory learning style, as determined by The Kaleidoscope Profile, and having below-grade-level reading comprehension, as determined by The Scholastic Reading Inventory (SRI)?

Review of the Methodology

The study involved seventh grade subjects from two junior high schools in a large

suburban Utah school district. All seventh grade students from one school who obtained parental permission and all seventh grade students from another school enrolled in two special reading programs (Read 180 and Special Education Reading) with parental permission became the subjects of the study. The study used these two schools because they had similar demographics and a large population of students who were reading below-grade-level.

For data, this research used The Kaleidoscope Profile to measure the subjects' sensory learning styles and SRI to measure the subjects' reading comprehension levels. The Kaleidoscope profile has subjects choose from lists of constructed phrases that include kinesthetic, tactile, auditory, and visual verbs to measure subjects' different sensory learning style characteristics. The Kaleidoscope profile gives its scores in numerical ranges for each style. The SRI test uses a reading passage and a response to that passage to measure subjects' reading comprehension levels and gives its scores in Lexile levels. The subjects took the computer versions of both assessments on two different days in computer labs during their assigned English class periods with their English teachers serving as the assessment administrators. After the researcher collected the data from both assessments, she compiled the data into an excel program and used The Statistical Package for the Social Sciences (SPSS) Version 16.0 to analyze it.

The study had two independent variables, reading level and school and one dependent variable, subjects' sensory learning styles. The researcher divided the Lexile scores into five categories – beginning reader, far-below-grade-level, below-grade-level, on-grade-level, and above-grade-level. The researcher also divided The Kaleidoscope Profile's sensory learning style scores into four categories – very strong, strong, mild, and weak.

After observing the frequency counts for each category of the variables, the researcher used Chi Square tests for independence, Analysis of Variance (ANOVA), and post hoc tests to check each of the hypotheses.

Summary of the Results

The Chi Square Test for Independence, using the variables specific learning styles and reading comprehension, indicated that there was a significant relationship between reading comprehension and the kinesthetic, auditory, and visual learning styles. As a result, *Null Hypothesis 1* was rejected as there is a relationship between learning styles and reading comprehension levels.

Further testing using ANOVA showed that when comparing different reading levels, there is a significantly different distribution of kinesthetic, auditory, and visual learning style scores. A post hoc test using this data revealed that the struggling reading group scored significantly lower in the auditory learning style when compared to the on or above-grade-level group. These data indicate that few subjects in the struggling reading category use an auditory learning style. As a result, *Null Hypothesis 2* was rejected as there is a difference in the distribution of specific sensory learning styles of struggling readers and of the specific sensory learning styles of on-grade-level readers.

Another ANOVA, which compared the variables of school and learning styles, revealed a significantly different distribution of kinesthetic, tactile, auditory, and visual learning style scores. The post hoc test showed that subjects from School A, which included all 7th graders with permission, scored significantly higher in kinesthetic, tactile, auditory, and visual learning style scores than the subjects in School B, which included only students identified as struggling readers by their placement. As a result, *Null Hypothesis 3* was

rejected as there is a difference in the distribution of specific sensory learning styles in School A and of specific sensory learning styles in School B.

Discussion of the Results

If students are not learning the way we teach them, we should teach them the way that they learn (Virginia Tech, n.d.). The results of this research show that there is a significant relationship between kinesthetic, auditory, and visual sensory learning styles and reading comprehension, so the subjects in both School A and School B would benefit from reading lessons that include multiple sensory learning style techniques. According to Carbo, Dunn and Dunn (1986) these techniques could include asking the kinesthetic and tactile learners to do some tactile activities that teach a concept the day before they will learn the concept and asking the auditory and visual learners use the activity to reinforce what they learn after they are taught the concept. It could include asking visual students to read about a new subject before it will be taught and asking auditory learners to read about the subject after it is taught. Honigsfeld and Dunn (2009) state that tactile and kinesthetic strategies help learners to form lasting connections between concepts and applications because the students will be more likely to internalize the information. Allowing students these choices would mean that a teacher would need to help students learn about their own learning style and then offer choices on when students should complete assignments for specific lessons. In fact, Dunn and Missere (2007) believe that it is a good idea to teach students about their learning styles so that they can help themselves learn.

There are many ways that an educator can incorporate learning styles activities to help improve student learning. For example, an educator can teach students to create study activities that match their learning styles. Kinesthetic learners might learn to tape pages of

information around a room so that they move around as they study. Tactile students might learn how to make task cards, which are index cards that the students have written information about the specific topic and have cut into irregular shapes that can only fit together. Auditory learners might learn to create mnemonics, chants, or songs. Visual learners might learn to create charts or graphs and to visualize information as they study. An educator can also teach explicit lessons using learning style activities. For example for an explicit lesson on how to use the visualizing reading strategy, a teacher might provide a reading activity that the students can choose to read before or after the lesson. The lesson might start with the teacher reading a children's picture book without showing the students the pictures and having all of the students draw pictures of what they are hearing. The class can discuss the difference between the various students' pictures and the pictures in the book. The lesson could continue with a mini lecture while the students take notes. It might continue with the students having a choice of writing descriptions to go with a picture or drawing a picture to go with a writing example. Throughout the year, the teacher could reinforce the activity by reminding the students to visualize as they read and by having the students draw what is in their book or write about what they see when they go places.

The results of the research also show that the auditory learning style occurred less frequently in the struggling reading group, so the struggling readers would not be as successful in an auditory classroom environment. However, 30% of teachers prefer the auditory style (Haggart, 2003). As these students continue into high school, they are more and more likely to experience classrooms that are highly auditory as many high school and college teachers tend to use lecture as a main teaching technique (Garet, Birman, Porter, Desimore, & Herman, 1999; Panitz, n.d.; Project Tomorrow & PASCO, 2008). This

struggling reader group is likely to struggle to succeed in these classes even if reading is not a requirement, as they will have trouble with the auditory format of the class. This difference between their learning style and the teaching style of the classroom combined with their troubles with reading could lead to them earning failing grades in lecture classes, failing to graduate from high school, or even dropping out of school in frustration. This group of students needs teachers who are willing to incorporate multiple teaching and assessment techniques into their teaching styles. They would also benefit from instruction that would help them develop strategies to use their strongest learning styles to improve their learning within auditory environments.

These struggling readers also would benefit from reading remediation that incorporates kinesthetic and visual activities (Carbo et al, 1996). These students would benefit from the use of notes or key words projected on the board while they are listening to lectures. They would benefit from close notes, which are the type of notes with words or phrases left out so that students can fill them in as they listen.

The comparison of learning styles between the two schools revealed that there was a significant difference in sensory learning styles in all four categories. An analysis of the descriptive statistics for School B revealed that more of the subjects had scores in the mild or weak in all of the sensory learning style categories. The students in School B were 1.7 times more likely to have mild to weak scores for kinesthetic, 1.3 times more likely to have mild to weak scores for tactile, 1.5 times more likely to have mild to weak scores for auditory, and 1.2 times more likely to have mild to weak scores for visual. Perhaps these mild to weak scores mean that School B's subjects need help developing strategies and techniques to learn. These data also show that the subjects in School B are more likely to struggle in any

classroom where the teacher uses a single learning style for instruction. The students in School B were more likely to have mild or weak tendencies in both the auditory and visual learning styles, but these are the most likely preferred learning styles of teachers: 30% of teachers are most likely to be auditory, and 40% are most likely to be visual (Haggart, 2003). The subjects in School B would benefit from multiple sensory lessons and multiple sensory classrooms. Because the students in School B are most likely kinesthetic or tactile, lessons should begin with kinesthetic or tactile activities. For example, an explicit lesson on sequencing might begin with a game that requires the students to follow the steps exactly to get to the end of the game. The teacher could then provide a mini lecture while the students take notes. After the lesson, the students could pair up and write recipes for how to make peanut butter and jelly sandwiches. Next, the pair groups write their recipes, they could read them aloud and follow the exact steps to create the sandwich. They can discuss steps they missed and then add those steps in the proper order to have a completed recipe. Finally, students can read passages on their reading level and create charts showing the sequences in those passages.

The researcher has made the following observations upon further analysis of the descriptive statistics. When comparing the averages of the categories of sensory learning styles for all of the subjects, the researcher found that the subjects were more likely to have very strong or strong tendencies in kinesthetic (69%) and tactile areas (59%) than in auditory (54%) and visual (36%). Haggart (2003) and Wayman (2003) believed that the traditional education system favors visual learners because a larger percentage of teachers prefer that learning style (40%). Also, most teachers use assessments that are developed and use the visual style (a paper and pencil test). However, because only 36% of the subjects of this

study have strong or very strong visual tendencies, they are the only ones who will gain the most benefits from this type of assessment and instruction. In a typical classroom, the other 64% will be spending at least part of their mental abilities adapting to learning and testing styles that do not fit strongly within their personal learning styles. Most of the subjects in this study would benefit from the inclusion of kinesthetic, tactile, and auditory teaching and testing techniques. These techniques could include creating assessments that include choices for the students. For example, students could create a song or poem, draw a picture or cartoon, write or act out a play, design a game or puzzle, design a web page or collage, or explain or teach the concept verbally to show that they understand the concept.

Explanation of Unanticipated Findings

Null Hypothesis 3 states that when comparing School A and School B, there will not be a significant difference in the distribution of specific sensory learning styles. However, when these data were analyzed, the results showed that there was a significant distribution in all areas. These results were unexpected because comparing School A, which included all levels of readers, with School B, which included only students already defined as struggling readers by their class selection (Read 180 or Special Education reading), was bound to show a different distribution. Since *Null Hypothesis 2* had already been rejected because the results had shown that when comparing struggling readers with grade-level or above-grade level readers, there was a significant difference between kinesthetic, auditory, and visual learning styles, and since there were only six on-grade-level readers at School B, there should have been a significant difference in the distribution when comparing the two schools. After a review of the data, the researcher realized that two additional areas she should have compared included 1) the struggling reading population of both schools and 2) the on-and

above-grade-level readers with the struggling readers of School A.

One problem that this researcher had was the difference between the expected percentages of subjects in each learning style and the percentages found in the data. Haggart stated that 40% of the general population is kinesthetic, 15% is tactile, 10% is auditory, and 35% is visual (2003). This research shows that 65% of the subjects tested had very strong or strong kinesthetic learning style tendencies, 59% had very strong or strong tactile learning style tendencies, 54% had strong or very strong auditory learning style tendencies, and 36% had very strong or strong visual learning style tendencies. Because the subjects in this study could have strong or very strong tendencies in more than one category, the percentages equal up to above 100%. The expected percentages and the percentages found in these data were not the same because this research is not comparing learning styles in quite the same way Haggart compared his subjects. Haggart defined a person's learning style based on which category was the highest. If a person scored highest in the visual category, he or she was a visual learner; if the person scored highest in the tactile category, he or she was a tactile learner. This research looked at how strong or weak each subject was in each learning style. Thus, a single subject could have strong preferences in tactile and visual learning styles. Because of this difference in definition, the percentages should not be the same.

Relationship of Current Study to Prior Research

The results of this study are consistent with the findings of other studies that link reading comprehension and learning styles. Wilhelm (2004) stated that many students with reading problems have kinesthetic learning styles and have never learned to visualize what they are reading. Robb (2000) stated that many struggling readers have never pictured an event or setting in a book, and many of these students have never used their imagination to

put themselves into books by “talking, living, dressing, and thinking like a character” (p. 89). She went on to state that because picturing images and imagining is more of a visual skill, when the teacher asks the class use those visual skills, there is a good chance that the kinesthetic and auditory learners will be unsuccessful. Geoghegan (1996) showed that over 50% of the struggling readers in her study were kinesthetic or tactile learners. Olsen’s study (1983) found that listening comprehension, reading comprehension, and using information related significantly to learning modalities.

Many past studies have shown that incorporating sensory learning style techniques into classroom lessons improved academic achievement (Barbe & Swassing, 1979; Cafferty, 1981; Carbo, 1980; Dwyer, 1998; Farr, 1971; McCarthy, 1994; and Trautman, 1979). Spires’ study (1983) showed that subjects achieved more word attack, reading comprehension, and math concepts when taught using multiple learning style strategies. Clemon’s study (1990) determined that multisensory activities that stimulated two or more modalities, simultaneously or sequentially, increased time-on-task and enjoyment in reading. Djabrayan’s study (1991) indicated that a multisensory teaching method improved the reading achievement of learning disabled students. Simpson and Yunfel’s study (2004) showed that learning styles had a significant impact on students’ enjoyment levels in class. Crosley’s study (2007) showed that middle school students had a better attitude towards learning if they had multisensory classroom environments. Thompson’s study (2007) showed that kinesthetic activities make learning academic skills easier. Burton’s study (2009) showed that including kinesthetic and tactile manipulatives helped kindergarten children be more successful with phonics reading instruction. Since the results of this study show that there is a significant relationship between sensory learning styles and reading

comprehension, past research would state that incorporating sensory learning style techniques into reading education should help improve subjects' reading comprehension levels.

Implications for Practice

Without the ability to comprehend what he or she is reading, a person is in danger of dropping out of school, having lower paying jobs, and repeating the cycle with the next generation (Alliance for Excellent Education, 2007; Kutner et al., 2007). Thus, finding ways to help students who are struggling readers break the cycle of reading failure is vital. There is no simple, one-dimensional, causal relationship to explain students' reading struggles (Manuel, 2003). This research suggests that sensory learning styles could be one factor affecting students' reading comprehension level. The results of this study can encourage elementary educators to include multisensory activities into reading instruction, teacher directed reading times, and individual reading times. The results could encourage secondary remedial reading teachers and content area teachers to discover students' learning styles and incorporate lesson strategies that address those styles. The results could encourage educational companies to develop multisensory reading programs for both beginning elementary reading classes and secondary school remediation classes.

The *No Child Left Behind Act of 2005* requires research-based instruction (U.S. Department of Education, 2005). The research data gathered in this study provide educators information that they can use to justify action research projects that would explore creative ways to implement sensory learning style techniques into the reading curriculum. Educators could also use this study to justify exploring ways to help students learn to adapt their learning styles to allow them to succeed when taught or tested in ways that favor other styles.

This study could provide teachers, schools, or districts the information needed to seek grants to implement programs that are multisensory based.

A perfect multisensory reading classroom would have reading materials on many levels in multiple genres. It would have areas where students can sit quietly and read, areas where they can move around while they read, areas that they can work alone, and areas where they can work together as groups. It would have noise reduction headphones and audio books available for students who want or need to use them. It would have a teacher who was comfortable with students wiggling and moving their bodies as they sit in their seats. Finally, it would have lesson plans that incorporate kinesthetic, tactile, auditory, and visual activities from the introduction of each concept through its assessment. While it may not be possible for every reading teacher to create the perfect multisensory classroom, this research indicates that adding multisensory activities might be one way to help struggling readers.

Limitations

One of the limitations of this study was that The Kaleidoscope Profile is a self reporting instrument, as students select tiles to represent what they feel or believe about the topics “I enjoy school when,” “School activities I enjoy,” “I value,” and “School is important because.” However, Performance Learning Systems had considered that when determining the validity of the profile. They compared their test subjects Kaleidoscope Profile results with subjects self assessments, with other self reporting instruments such as Dunn, Dunn, and Price’s Learning Style Inventory, and with the expected trait populations and found The Kaleidoscope Profile to be valid and reliable (Haggart, 1998).

A second limitation of this study was the way that The Kaleidoscope Profile presents

its results. The results do not tell subjects that they have a specific learning style. Instead, The Kaleidoscope Profile reports scores as a number in each category: the higher the number the greater the subject's tendency in that area. When this researcher was looking for assessments to use to determine sensory learning styles, The Kaleidoscope Profile was the only assessment in publication that had any reliability or validity data associated with it. Because of the lack of other available assessments, even though The Kaleidoscope Profile did not give results which labeled subjects as "kinesthetic," "tactile," etc, this researcher chose to use it. To overcome the limitation, the researcher created the categories of very strong, strong, mild, and weak for each sensory learning style.

A third limitation was that the subjects were restricted to all of the students from one school and the students in the reading classes at the second school. Time, computer lab availability, and cost of the Kaleidoscope Profile limited the number of subjects from School B. Because School B only had one computer lab, the lab schedule did not allow time for more English classes to participate. The cost of The Kaleidoscope Profile also limited the sample size to fewer than 400 students.

Recommendations for Additional Research

Additional research within the district would show if the relationships between the sensory learning styles and reading comprehension levels remains the same in other schools. A researcher could develop the following questions:

- Would the results be the same at other schools?
- Would the results be the same when comparing schools with different demographics?
- Would the results be the same when comparing different ethnic groups or language groups?

- Would they be the same when comparing elementary school students?

Additional research could also focus on how specific reading strategies and assessments can be adapted to a multisensory approach. The questions that a researcher might ask include:

- Which teaching strategies and assessments will adapt best to multisensory adaptations?
- How many multisensory adaptations do students need to bring up reading comprehension levels?
- How long do adaptations need to continue?
- After a student has learned a strategy, can they learn to substitute mental activities for physical strategies (imagining movement instead of actual movement, thinking sound instead of physical sound)?

Finally, research could look at the ways technology is affecting this topic. Some questions that a researcher could ask include:

- Is technology changing people's sensory learning styles?
- How are the internet, texting, blogging, IMing, Facebooking, and other social networks affecting sensory learning styles and reading comprehension levels?
- What technology is available to help teachers tap into students' sensory learning styles?

Conclusion

This research began with the question, "Among seventh grade students in two suburban schools in Utah, what is the relationship between having a specific sensory learning style, as determined by The Kaleidoscope Profile, and having below-grade-level reading

comprehension, as determined by The Scholastic Reading Inventory (SRI)?” Based on the analysis of the results from The Kaleidoscope Profile and the SRI tests of the subjects from two suburban junior high schools in Utah, there were significant relationships between subjects’ sensory learning styles and reading comprehension levels. While there are many factors involved in reading comprehension, this study suggests that being aware of students’ learning styles and adapting lessons to include activities in all learning styles may be beneficial to help students in reading.

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Appendix A

Dear Parent(s) or Guardian(s),

Your student's class has been asked to be involved in a research project for a doctoral dissertation that will look for relationships between seventh grade reading levels and sensory learning styles. We hope to discover more about how individual learning styles and reading levels are connected. Understanding more about these relationships, will help teachers to develop better reading lessons for a variety of students. The study is being conducted by Mrs. Judy Williams and will be called Reading comprehension, Learning Styles, and Seventh Grade Students.

Your student's involvement in this study will mean that his his/her SRI reading scores will be compared with his/her scores on an online learning style profile. Your student has already taken the SRI as part of his/her beginning of the year placement and will be taking an online learning style profile as part of an in-class assignment. Your student's privacy will be protected using his/her district-assigned ID number as part of the data collection. After the data is collected, Mrs. Williams will assign a different ID number to represent your student for the dissertation paper. The final report will only identify the students by researcher-assigned numbers, which will not be the same as their district ID numbers. In other words, your student's individual information will be protected.

The only thing your student has to do to be included in this research project is to return this letter indicating your permission. No undue stress on your student is anticipated from participating in this study. Participation is voluntary, and anyone not wishing to participate will have his/her data excluded from the research.

You can obtain a copy of the completed report from Mrs. Williams by contacting her at jlwilliams@dmail.net. You may also use this e-mail or call 801-402-6739 to ask her any questions about the study.

After marking the attached form with your decision, please sign it, and have your student return it to his/her teacher by _____.

Thank you,

Mrs. Judy Williams

I give permission for my student to participate in this research project.

I do not want my student to participate in this research project

_____ Student's printed name

_____ signature _____ date