

THE IMPACT OF LEARNING-STYLE BASED INSTRUCTION ON STUDENT
ENGAGEMENT AND READING COMPREHENSION IN A THIRD GRADE
CLASSROOM

A Thesis by

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The following faculty members have examined the final copy of this thesis for form and content, and recommend that it be accepted in partial fulfillment of the requirement for the degree of Master of Education with a major in Curriculum and Instruction.

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DEDICATION

To my husband, my children, my administrators and teaching cohorts

Always be on the lookout for the presence of wonder.

-E.B.White

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ABSTRACT

The researcher examined various strategies in an attempt to increase student engagement and academic achievement in the classroom. A study was conducted on 23 students in a third grade reading classroom in a midwestern, suburban elementary school with a population of 863 students. The researcher assessed each student's learning style: visual, auditory, kinesthetic, and tactual. Half of the students were placed in a group matching their dominant learning style, while half were randomly chosen to be placed in a group other than their dominant learning style. The researcher implemented differentiated learning plans for each learning style group and documented their engagement as well as academic progress. It was determined that the learning style based instruction was very successful for some students but not for others. Student engagement showed a wide range of results for the matched students as well as the unmatched students. Most students' academic gains as measured by weekly reading tests were small; however, the students who were strong in the visual learning style made the highest gains. The researcher concluded that the results did not justify the extra resources needed to implement learning-style based instruction in the classroom setting.

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CHAPTER 1

INTRODUCTION

Student academic achievement is a primary goal for classroom teachers; however, this can be difficult to successfully prescribe. Students arrive in a classroom with a large range of previous knowledge and experiences, as well as a variety of learning styles. These things must be taken into consideration as classroom teachers work toward academic success for all students.

Previous studies on achieving academic growth have shown that student engagement has a positive impact on achieving such growth (Bodovski & Farkas, 2007; Wu, Hughes, & Kwok, 2010). Fredericks (2011) noted that researchers, educators and policy makers have become more focused on student engagement in school as a way to address problems of low achievement and high levels of boredom and alienation (p. 328). Bodovski and Farkas (2007) concluded that to achieve greater academic growth for the students whose beginning achievement falls in the lowest category, teachers should focus on increasing student engagement (p. 125).

Many questions arise as student engagement is examined. How is “engagement” defined? Can student engagement be measured? What tools can be used to measure engagement? Finally, it is important to explore options for enhancing student engagement in the classroom.

An initial examination of these questions occurred in the 2011-2012 school year. The researcher noticed some students struggling with motivation every

year. Their lack of classroom engagement posed serious risks for their academic success. In the Spring of 2012 a preliminary study was conducted on the effects of differentiated instruction on student engagement and academic growth in a third grade classroom. More specifically choice boards were implemented during Reading instruction, allowing students to choose instructional activities suited to their interests and needs. The results of this study showed increased engagement as noted by student surveys and teacher observations. A high rate of academic growth was also noted during this two-week study. It is equally important to note that student feedback was very positive concerning the implementation of these learning strategies.

As the 2012-2013 school year began, and as the classroom of students changed, the researcher noted several new students struggling with the same issues of low motivation and academic engagement in the classroom. After examining the effects of choice boards the previous school year, other approaches to implement in the classroom that would have a positive influence on student engagement were sought. The researcher examined a similar question, "What are other learning strategies that might influence a student's academic engagement and reading comprehension in the classroom?"

REVIEW OF THE LITERATURE

To discover methods of increasing engagement and performance of elementary-aged students, the literature review focused on student engagement (cognitive, behavioral, and emotional), motivation, differentiation, and learning styles. The review focused on defining these concepts, examining their impact in the classroom, and discovering how engagement and reading comprehension were improved in the studies of other researchers.

Student Engagement

Defining student engagement. Engagement can be defined in a variety of different ways. Bodovski & Farkas (2007) define engagement as “involving three components: learning-related work habits (active participation, persistence at tasks, completing work, taking challenging classes), cognitive behaviors (attention, problem-solving), and emotions (enthusiasm, interest)” (p. 118). Rotans and Schmidt (2011) sought to define engagement by saying that it is the extent to which students are willing and able to take on the learning task at hand. “Cognitive engagement in the classroom can be characterized as a psychological state in which students put in a lot of effort to truly understand a topic and in which students persist studying over a long period of time” (p. 465). Voke (2002) determined that a student who is engaged is intrinsically motivated to learn and makes a psychological investment in their learning. When Dolezal and his partner researchers refer to engagement, they are defining it as a “...high degree of on-task behavior with tasks that are appropriately, academically demanding

(i.e., students can do them with some effort) and worthwhile for students (i.e., pertinent to important content in the elementary curriculum) (Dolezal, Wels, Pressley & Vincent, 2003, p. 243).

Studying student engagement. It is beneficial to consider the work of classroom teachers who excel at motivating their students. Researchers Dolezal, Wels, Pressley and Vincent (2003) observed and interviewed nine third grade teachers in eight Catholic schools and observed student work and behavior in order to assess how teachers encouraged student engagement. Their practices were examined to determine how to better engage students and to identify habits that undermine engagement. “Analyzing the behaviors of teachers who motivated their students might provide insights about how other classroom teachers could change their teaching so as to increase student engagement and academic commitments” (Dolezal, et al., 2003, p. 240).

Strategies to improve student engagement. Successful teachers employed many strategies in order to improve student engagement, such as cooperative learning techniques, scaffolded student learning, and opportunistic mini-lessons (Dolezal, et al., 2003; Fredericks, 2011). Teachers who effectively fostered engagement in their students also encouraged student autonomy and creativity (Fredericks, 2011; Rotgans & Schmidt, 2011; Lent, 2012). It was also found that students need to be participating in authentic, personally meaningful, and relevant work, where instruction is tied to topics and problems that are interesting to students (Karschney, 2012; Voke, 2002).

Teacher-student relationships. Several studies noted that highly-motivating teachers had positive, caring relationships with their students and placed high importance on setting a positive tone in their classroom (Dolezal, et al., 2003; Fredericks, 2011; Wu, Hughes, & Kwok, 2010). Wu and his cohorts noted that “the effect of a supportive teacher-student relationship on achievement is due to the direct effect of teacher-student relationship quality on students’ engagement in the classroom” (Wu, et al., 2010, p. 358). Others even suggested that “students’ perceptions of positive relationships with their teacherswere more strongly linked to student interest in school than perceived support from parents and peers” (Wentzel, 1994, 1997, as cited by Urdam, 2006, p. 340).

Motivation

A major component of student engagement is motivation. In the early days of American education it was believed that motivation was something students either had or didn’t have, and teachers could have very little effect upon a student’s motivation status (Frymeier, 1965; Urdan, 2006). In the mid-twentieth century research began to be conducted on how to influence student motivation in the classroom. In his studies Frymeier (1965) concluded that “teachers concerned about their youngsters’ motivations have to do much more than use a carrot on a stick or a paddle on the behind if they hope for significant changes in any way” (p. 569). He felt that more research should be conducted in the field of motivation in order to bring about significant change.

Thankfully, there has been further research, which has led to an evolution of thinking concerning the motivation of students in the classroom. Researchers

began to examine the influence of the learning environment (Bowman, 2011; Dolezal, 2003; Urdan, 2006) as well as the contextual influences at work impacting student motivation (Marks, 2000; Urdan, 2006, p.332).

Early research in motivation. Harry Harlow, University of Wisconsin pioneering psychology professor, founded one of the world's first laboratories for studying primate behavior in 1949. His research involving rhesus monkeys solving puzzles led to some new ideas in regards to motivation and the drive to succeed. The researchers found that the monkeys began solving the puzzles not for food, water, or other external rewards. The monkeys found that the performance of the task provided an intrinsic reward. They found it gratifying to do so even without the extrinsic rewards (Bowman, 2011). Many questions remained unanswered about motivation theory, but the idea was developing that perhaps intrinsic rewards were more powerful for enhancing motivation than extrinsic rewards.

Another pioneering behavioral scientist, Edward Deci, sought to further Harlow's research findings at Carnegie Mellon University in 1969. Deci began to look at human motivation and found that most of his findings went against the common beliefs held by the scientists and educators of the day. He found that even though extrinsic rewards in the classroom can bring about an immediate display of engagement, it doesn't last long and sometimes adversely affects a student's long-term motivation (Bowman, 2011, p. 265). Teachers need to seek to inspire students to work for internal pride of accomplishment rather than for only what is rewarded. The culminating idea coming out of this research as well

as others since then is that “impactful teachers guide students to greatness by inspiring them to discover where their talents and passions intersect so that one’s unique strengths result in an increase in performance, service, and life-satisfaction” (Secretan, 2005, p.14, as cited by Bowman, 2011, p. 267).

“Anyone who has ever visited classrooms in Singapore or China cannot help but be impressed by the intense engagement of students with the lesson and by the sheer amount of time students study outside school” (Stewart, 2012, p. 91). Stewart further indicates that families in these countries place high value on education as a way to achieve upward mobility in society. There are also strong beliefs in the idea that effort, not ability, is the major factor contributing to success. Finnish students show higher levels of engagement as well. Their system of education focuses on discovery and self-directed learning beginning in elementary school. However, all countries have some students who struggle with motivation. Singapore, Canada, and Finland all have programs in place to encourage academic engagement and multiple pathways designed to achieve high standards. It is recommended that teachers have access to the best classroom practices on instruction and engagement.

Differentiated Instruction

One instructional strategy used to encourage engagement is differentiated instruction. Differentiated instruction is a learning strategy that seeks to match an individual student’s strengths with instruction and assessment (Karschney, 2012; Lauria, 2010; Tomlinson, 2005, 2008). It takes into account a student’s readiness, interest, and preferred mode of learning (Tomlinson, 2008).

“Differentiated instruction seeks to maximize each student’s growth by recognizing that students have different ways of learning, different interests, different ways of responding to instruction, and preferred ways of learning and expressing themselves” (Lauria, 2010, p.24). Tomlinson points out that education has not kept pace in practice with what is known through current research. Most educators believe that students come to school with different needs and learning styles; however, few classroom teachers are employing strategies to meet those needs and accommodate the student’s personal styles of learning (Tomlinson, 1999). Others have also stressed the increasing need for differentiation in our current atmosphere of growing classroom diversity (Kise, 2011; Tomlinson, 2005).

Reis et al. (2010) examined the effect of a differentiated reading program on students’ oral reading fluency and comprehension on second through fifth graders at five elementary schools. The results indicated that an enrichment reading program with differentiated instruction and less whole group instruction was as effective or more effective than the whole group basal reading strategy. “Results showed that the use of both differentiated instruction and enrichment teaching methods, including high-interest, self-selected books that are above students’ current independent reading levels, resulted in higher reading fluency and comprehension in some students” (p. 492).

There are several instructional strategies that support differentiation in the classroom: stations, complex instruction, orbital studies, centers, entry points, tiered activities, and learning contracts (Tomlinson, 1999). Hauser also suggests

the implementation of tiered assignments, compacting, interest centers, flexible grouping, learning contracts, and choice boards(Hauser, n.d.).

Learning Styles

One way to utilize differentiated instruction in the classroom is to tailor instruction to the preferred learning styles of the students. Learning styles are described as students' "preferences for gaining energy, taking in information, and making decisions, all key processes in education." (Kise, 2011, p. 68.) Others have defined them as "the broad approaches used to learn a subject" (Oxford, 1995, as cited by Aliakbari & Tazik, 2011, p. 657). Several learning style models have been established over the past several decades, with different theories, measurement tools, and terminology (Cassidy, 2010; Desmedt & Valcke, 2004; Dunn & Dunn, 2005; Rayner and Riding, 1997). Upon examining the research in this field, Rayner and Riding (1997) made a case for the need to integrate the various models of style into a single theory of learning styles. In their study the researchers were focusing on the four types of learners; visual, auditory, tactual and kinesthetic (Dunn & Dunn, 2005; Rayner & Riding, 1997). Although there are many other learning preferences, these styles are easiest to institute and manipulate in the classroom setting with recognizable results (Aliakbari, 2011).

Dunn and Dunn (2005) have studied learning styles for several years and have made an effort to describe each of the four learning styles. The visual learner remembers best by seeing information. They can learn new information better when using pictures, charts, graphs, and diagrams. It is important that these learners take notes during a lecture in order to increase their retention of

the information. These students also exhibit strong visualization skills. Unlike the visual learner, the auditory (or aural) learner learns best by listening to information through conversations and lectures. They have well-developed vocabulary and strong conversational skills. Many teachers favor this style of teaching in their classrooms. Students preferring the tactual style favor “hands-on” activities in the classroom. They learn best through tactile methods, such as making models, stamping spelling words, and using math manipulatives. The most under-served of the learning styles is the kinesthetic learning style. These students want to involve their whole body in learning activities, concentrating best when movement is involved. They learn best by participating in floor games, real life experiences, or role playing.

Several previous studies have agreed that students learn best when being taught in their dominant learning style (Aliakbari & Tazik, 2011; Braio, 1997; Dunn & Dunn, 2005; Haar, Hall, Schoepp, & Smith, 2002; Loo, 2004; Rosenfeld & Rosenfeld, 2008). As some observed classroom teachers became more aware of recognizing and addressing individual learning differences, they began to reach out more to struggling learners (Rosenfeld & Rosenfeld, 2008, p. 245). Haar, et.al (2002) found that teachers who appeal to a student’s learning style continually monitored student progress and adapted their teaching to styles that fit their students’ needs. In Burke and Dunn’s research (2002) on the effect of learning-style based teaching in the Freeport School district the district’s teachers received training in order to identify each student’s learning style preferences. After making curricular adjustments, teachers noticed that students became more

academically engaged when learning was geared toward their learning style. “All students in Freeport’s learning style classes performed better on the standardized achievement tests when using their learning styles” (p. 105).

Brand, Dunn, and Greb (2002) concluded that students with attention deficit hyperactivity disorder displayed more academic progress when taught with a variety of learning styles designed to fit their needs. The benefits of learning-style based teaching were evidenced in initial learning and long-term retention. (Braio, et al., 1997). Teachers in this study also noticed that many of the children exposed to learning style instruction began assuming more responsibility for their own learning during the course of the study.

It is not necessary to implement a multi-sensory approach for all students. “Rather, students required to master new and difficult academic material should initially be exposed to it through their primary perceptual strength” (Dunn & Dunn, 2005, p. 276). Braio and her fellow researchers (1997) recommend that teachers need to identify the tactual and kinesthetic learners before they begin to fall behind academically. Teachers need to address their learning style preferences. “When aware of the effects of teaching low achievers with approaches designed to match their individual learning styles, it is difficult to defend teaching them with traditional lectures and discussions.” (p.24).

Since not all teachers are implementing these strategies into their classrooms, some researchers recommend that teacher training programs as well as professional development opportunities need to address learning styles (Burke & Dunn, 2002; Haar, et al., 2002. Rosenfeld & Rosenfeld, 2008). It was

suggested that mentoring relationships need to be established to strengthen the practice of addressing the learning style needs of students (Haar, et. al, 2002). Accomplished teachers in this area could be matched with new teachers or those needing improvement. “A mediated, constructivist and collaborative professional development, which sensitizes teachers to individual learning differences, can increase effective teacher beliefs about students” (Rosenfeld & Rosenfeld, 2008, p. 245).

It has also been suggested by some researchers that teachers and students should learn to assess their own learning styles, which would enable students to recognize their strongest modality (Haar, et al., 2002), helping them “become aware of strategies to learn more effectively in situations where their dominant mode is not being used” (p.145). It would benefit learners to be flexible, as most students will not always find themselves in classes appealing to their preferred learning style. “It is recommended that educators use a variety of learning methods, and encourage students to be receptive to different learning methods, rather than try to link specific learning methods to specific learning styles” (Loo, 2004, p. 107).

Opposing points of view. Not all of the literature reviewed suggested that learning-style based instruction was beneficial in the classroom. Some have pointed out problems associated with the research concerning learning styles (Doyle & Rutherford, 1984; Paschler, et al., 2008). The journal “Psychological Science in the Public Interest” commissioned four cognitive psychologists to determine whether or not the application of learning style practices in the

classroom could be validated with scientific evidence. They divided their assignment into two categories: (1) examining the learning styles concept to decide what type of evidence would validate its educational application and (2) searching the literature available to see if this evidence existed. (Paschler, et al., 2008).

In their research these psychologists found a lack of methodologically sound studies of learning styles. They spelled out the specifics of a study's parameters that would meet their criteria. First, students must be tested and placed into groups based on their dominant learning style. Then students from each group should be randomly assigned to receive learning-style based instructional methods from one of the styles chosen. Finally, the same final assessment should be given to all students in order to effectively demonstrate academic achievement whether the students' styles are matched to instruction or not matched to learning-style based instruction (Paschler, et al., 2008). Because of a lack of validating research and in light of some research revealing contradicting evidence against the learning-styles theory, the researchers concluded that currently there is "no adequate evidence base to justify incorporating learning-styles assessments into general educational practice" (Paschler, et al. 2008, p. 105).

Current study. While evaluating various strategies to address the need for greater student engagement in the classroom, increasing motivation, differentiation, and learning style-based instruction were examined. Increasing motivation and classroom engagement have been shown to strengthen academic

achievement. (Bodovski & Farkas, 2007; Dolezal, et al., 2003; Fredericks, 2011; Urdam & Schoenfelder, 2006). Several researchers have focused on the impact of differentiation on student engagement, concluding that it has a positive influence. (Reis, et al., 2010; Tomlinson, 1999; Tomlinson, et al., 2003) In Spring, 2012 the researcher studied the impact of choice boards in the classroom as a method of implementing differentiated instruction following a pretest of knowledge and skills. Positive results were seen both in student engagement and academic achievement on an identical posttest. After an examination of the effects of differentiation in the classroom, a new question arose concerning on what basis to differentiate. That led to further research into learning-style based teaching methods. Differentiating on the basis of a student's learning style is one way to personalize instruction and address the needs of individual students. What impact would this strategy have in the classroom? The researcher devised a plan to investigate this question: "What is the impact of learning-style based instruction on student engagement and reading comprehension in the elementary classroom?"

METHODOLOGY

This study focused on the use of strategies related to learning styles (Dunn & Dunn, 2005). A variety of activities related to visual, auditory, tactual, and kinesthetic styles were implemented systematically to determine the effect of each on individual students. The researcher noted the impact of this learning-style based teaching on student engagement and reading comprehension.

Participants

In Fall 2012 and Spring 2013 a study was conducted by the researcher on the effects of learning-style based instruction in a third grade classroom at a Midwestern suburban elementary school with a population of 863 students from chiefly middle to upper-middle class families. Economically disadvantaged students made up 13% of the school's population. The elementary school had five classes of each grade level: Kindergarten through fifth grade. The researcher's classroom had 23 students with 12 of the students being boys and 11 being girls. Six percent of the students included in the study were a racial minority. One student had been diagnosed with learning disabilities, but was participating in the regular education classroom with inclusion services and was included in the study.

Table 1 describes the initial study participants. Students were accounted for by number, and gender was noted. The reading test scores were averaged for the traditional instructional unit. Engagement was recorded by the researcher as

well as by the students, using a self-assessment questionnaire, with one being the lowest and five being the highest. The results of the online learning style inventory were recorded, including the breakdown of strengths in all four different styles: visual, auditory, tactual, and kinesthetic. Those results were compared with the researcher's observations to arrive at the student's dominant learning style. This is noted in the final column, called "Observed Dominant Style."

TABLE 1

PARTICIPANT OBSERVATIONS AT THE COMMENCEMENT OF THE STUDY

Student	Gender	Prior Rdg. test avg.	Engagement - high, medium, low	Student Engagement Questionnaires	Learning Style Online Inventory	V	A	T	K	Observed Dominant Style
1	F	91%	M	4.6	A,K	2	4	3	4	auditory
2	M	85%	H	3.5	A,K	3	4	4	2	auditory
3	M	72%	M	5	A	2	4	3	2	kines- thetic
4	F	98%	M	2.8	V,T,K	4	1	4	4	visual
5	M	81%	L	4.5	A, T	3	4	4	2	auditory
6	F	94%	L	5	V	3	2	2	2	visual
7	M	84%	L	4.8	T,K	2	2	4	4	visual
8	F	93%	M	5	A,T,K	3	4	4	4	auditory
9	M	93%	M	4.8	T,K	0	1	4	4	tactual
10	F	87%	M	5	T,K	3	3	4	3	visual
11	M	96%	L	4.6	V,A,K	4	4	1	4	visual
12	M	90%	M	4.6	T,K	3	3	4	4	tactual
13	F	91%	M	4.1	V,T,K	4	3	4	4	visual
14	M	95%	L	4.7	T,K	1	3	4	4	tactual
15	M	75%	M	4.8	V,T	4	3	4	2	tactual
16	F	82%	M	4.9	K	2	2	2	4	kines- thetic
17	M	97%	L	5	V,T	4	3	3	0	tactual
18	F	97%	L	4.3	T	3	2	4	3	tactual
19	F	98%	M	4.9	V,T,K	4	2	4	4	visual
20	M	89%	L	4.1	V,T,K	2	1	4	4	kines- thetic
21	M	91%	L	5	T,K	3	2	4	4	kines- thetic
22	F	96%	M	5	V,A,T, K	4	4	4	4	visual
23	F	98%	H	4.8	V,T,K	4	2	4	4	visual

Notes. Student engagement was measured on a scale of 0-5, with 5 being highly engaged. These abbreviations were used to describe dominant learning styles: V-visual, A-auditory, T-tactual, and K-kinesthetic.

Participants' description. Several avenues were used to analyze the students prior to the start of the research study. Observations were conducted of each student involved in the reading classroom in order to establish the student's dominant learning style. An online test was also given to each student in order to validate these results. The test was found on www.learningstyles.net, the official website promoting the Dunn and Dunn Learning Style Model. These tests are designed for specific age groups, with the test given aimed at seven to nine year olds. The introduction was read to the students as a whole group in a computer lab. They completed the survey independently. Results were instantaneous and described the learning style and preferences of the student.

Students were then grouped with others favoring the same learning style: Visual, Auditory, Tactual, and Kinesthetic. Tactual learners made up the largest group in the class with 39%. The next largest group was Visual learners with 30%. Seventeen percent of the students were classified as Auditory learners, and 13% were Kinesthetic learners.

In the weeks leading up to the study additional data were collected during reading instruction. These data serve as baseline, pre-differentiated instruction scores. Reading comprehension and vocabulary test scores were recorded during conventional instructional units. The students' averages were fairly high with 65% scoring 90% or above, 26% scoring 80-89%, and 8% scoring 70-79%. The researcher obtained student engagement documentation through observations as well as student questionnaires. (See Appendix A and B). Student engagement was categorized as high, medium and low. The students in

the class were rated as 65% highly engaged, 26% medium engagement, and 8% showing low engagement. In contrast to the teacher's evaluation of engagement, the participants scored themselves fairly high on classroom engagement. On a scale of 0-5 the class average for engagement was 4.6, with the lowest scoring 2.8 and seven students scoring a 5. This information on conventional teaching test scores and student engagement is also included in Table 1.

Procedures

For five weeks, the researcher conducted Reading instruction with more traditional methods: whole group instruction, silent and group readings, worksheets, etc. The weekly lesson plans were written without considering the various learning styles. Later the lessons plans were analyzed to determine the learning style addressed by each instructional method and activity. It was determined that the activities were broken down as follows: visual – 33%, auditory – 50%, tactual – 14 %, and kinesthetic – 3%.

A test was given each week after completing every story to assess reading comprehension. The test included some multiple choice and short answer questions. The scores from all 5 tests were averaged to find a mean score for each student involved in the traditional teaching style instruction.

In the initial stages of the research study students were familiarized with the concepts necessary to proceed. Various vocabulary words were introduced, including “engagement.” The engagement self-assessment survey (see Appendix A) was explained to the students and utilized at various times throughout the day. The concept of learning styles was discussed, in order to aid the students in

understanding the goals of the study. Observations of classroom behaviors as relating to engagement and learning styles were recorded, and an online learning style assessment was administered (Dunn & Dunn, 2010).

A series of reading lessons was designed by the researcher utilizing the four different learning styles. Some of the individual learning activities were implemented in the weeks prior to the research to familiarize the students with the expectations of those strategies. For a two week time period students were allowed to select activities from a choice board containing projects addressing the four different learning styles. Their choices were recorded and analyzed in light of the students' dominant learning style. Students were not grouped at this time with those sharing a common dominant style. They were allowed to choose instructional preferences.

As the learning-style based portion of the research study commenced, students in the experimental condition were placed in groups based upon their learning style preferences: visual, tactual, auditory, and kinesthetic. Teacher observations and the online test were used to determine these preferences. Students were randomly chosen to be matched to instruction based on their dominant learning style, representing 50% of the class. The other 50% of the students were matched to instruction from another learning style. The curriculum and learning activities were based upon one of the four learning styles being examined: visual, auditory, tactual, and kinesthetic. (see Appendices C, D, E & F.)

This learning-style based instructional model was carried out for four weeks. Students were seated in the classroom at tables with the others in their learning style group for the duration of the study. During class reading instruction time, the students were given assignments to fit their learning style. The visual group engaged in activities such as making visual representations of their vocabulary words and illustrating the story sequence. The auditory group wrote stories and poems, while the kinesthetic group participated in skits and mock interviews with the story characters. The tactual group made vocabulary representations with clay and constructed jigsaw puzzles of story scenes. These assignments were designed to address pre-reading vocabulary instruction, reading the weekly stories, and various comprehension strategies, such as story elements and compare and contrast. The groups engaged in these activities simultaneously, with the teacher monitoring each group, as well as making classroom observations.

During this time, the researcher made observations concerning student progress, opinions, and engagement. Following each of the four weeks of research, students in both groups were given the same reading assessment in order to compare reading comprehension for both groups. These tests included multiple choice and short answer questions in the same style as the baseline tests given during traditional instruction units. Student engagement was also measured via student questionnaires, teacher observation and outside observer ratings during the study period. The outside observer's ratings were compared to the teacher's ratings to insure inter-rater reliability.

Assessments

As students worked on classroom assignments during the duration of the learning style research, their levels of engagement were measured by teacher observation (see Appendix A) and through student self-assessment (see Appendix B). At the end of each week, a comprehension and vocabulary quiz was given to assess the students' reading comprehension. These tests included multiple choice and short answer questions. The engagement observations and the comprehension scores were compared with the scores from the weeks when learning-style based instruction was not being utilized. The scores were analyzed to evaluate the effectiveness of the learning-style based instruction upon student engagement and comprehension. The scores for sub-groups based upon learning styles and levels of engagement were examined to detect variations in the effects upon the students. A comparison was made by the researcher between the gain scores of the students matched with instruction based on their dominant learning style and those purposely not matched to instruction based on their dominant learning style. Based upon these comparisons, evaluations were made on the effectiveness of learning-style based instruction on engagement as well as reading comprehension.

Results

In this study the researcher examined this question: “What is the impact of learning-style based instruction on student engagement and reading comprehension in the elementary classroom?” First, the researcher analyzed and compared the results of the traditional learning methods with the learning-style based instruction. Second, the researcher examined the differences in the results of the learning-style based instruction on the group matched to their learning style preferences and those purposely unmatched. Data was examined in the areas of student engagement as well as reading comprehension.

Engagement

Throughout the course of this study student engagement was measured in several ways. In an attempt to triangulate the data, the researcher gathered information about engagement through three different sources: student questionnaires, researcher observations using a rubric, and ratings by two outside observers using the same rubric (see Appendix G). Using the information obtained from the student questionnaires, the class mean for each group was determined for the weekly engagement level during the learning-style based instruction. The first three weeks remained fairly constant with the final week showing a drop from week three. This trend was evident among the matched students as well as the unmatched students. Figure 1 shows the results of the student questionnaires for each week.

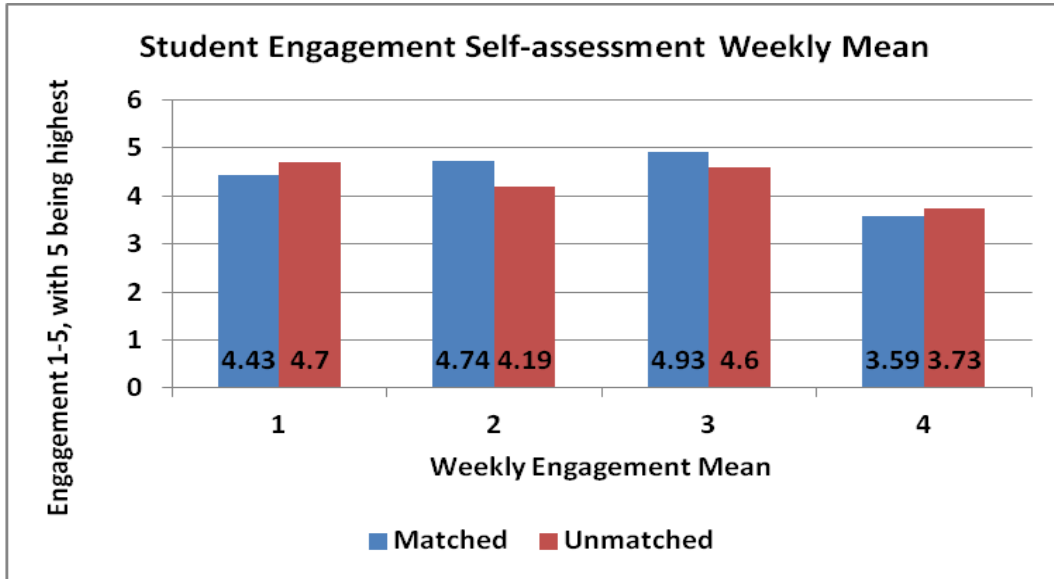


Figure 1. Student engagement self-assessment results as measured on a scale of 0-5, with 5 being highly engaged.

Most of the students indicated lower engagement on their self-assessments during the learning style based instruction than during the traditional units of study. While examining the engagement of only the students matched to their dominant learning style, the researcher noted that their engagement actually dropped 6% from the traditional instructional methods to the learning-style based instruction. The unmatched students showed a decrease of 13%. Figure 2 shows the scores for both groups.

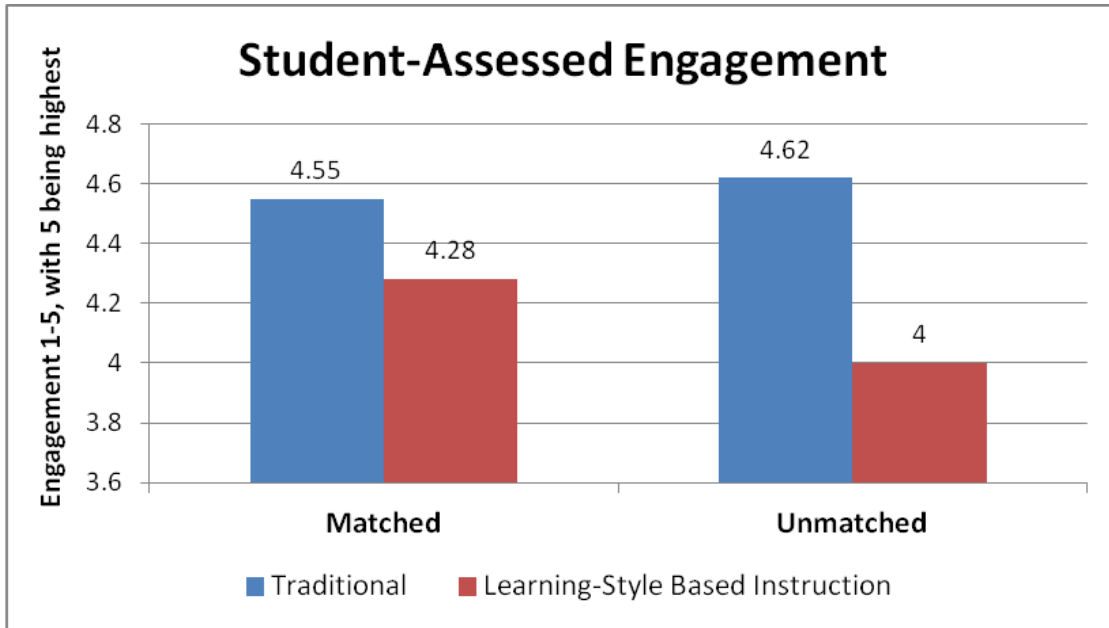


Figure 2. Student-assessed engagement results comparing matched and unmatched students.

The classroom researcher also rated the students' engagement using a rubric (see Appendix G). Students were scored during the traditional unit as well as during the learning-style based instruction. The students' mean engagement score showed a 6% increase from the traditional to the learning-style based instruction. Figure 3 shows the students' mean engagement scores comparing the two instructional strategies.

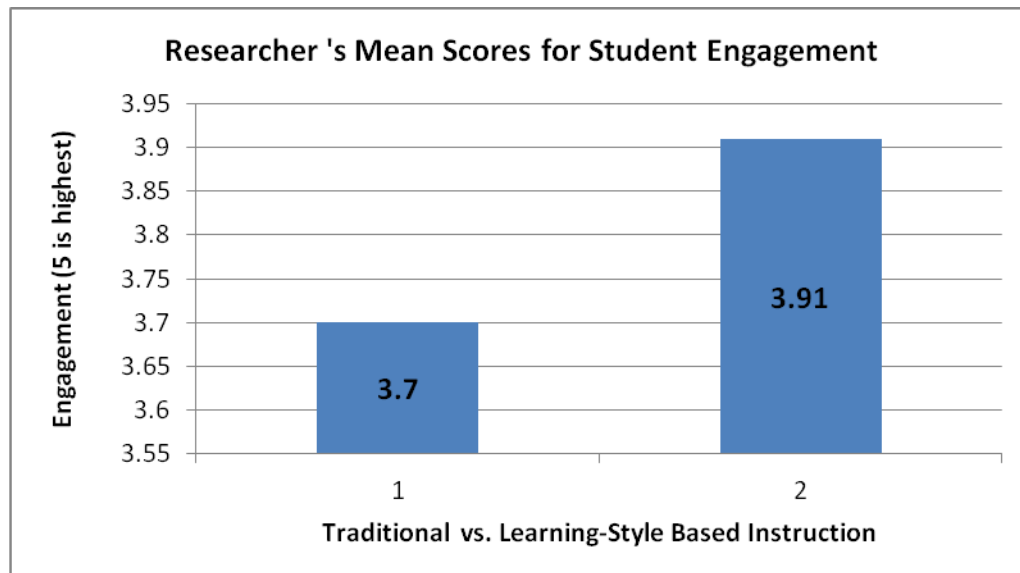


Figure 3. Researcher's student engagement mean scores, measured using a rubric, with 5 being the highest.

The researcher also compared the engagement results of the matched students with those that were unmatched during the two instructional units. Both groups saw increases from the traditional instruction to the learning-style based instruction, with the matched group showing a 7% gain and the unmatched group showing a gain of 6%. The standard deviation for the matched students during the traditional instructional unit was 0.67 and during the learning style instructional unit was 0.34. The standard deviation for the unmatched students was 0.65 and 0.79 respectively. Figure 4 shows the student engagement scores for both groups as assessed by the researcher using a rubric, with 5 being the highest score.

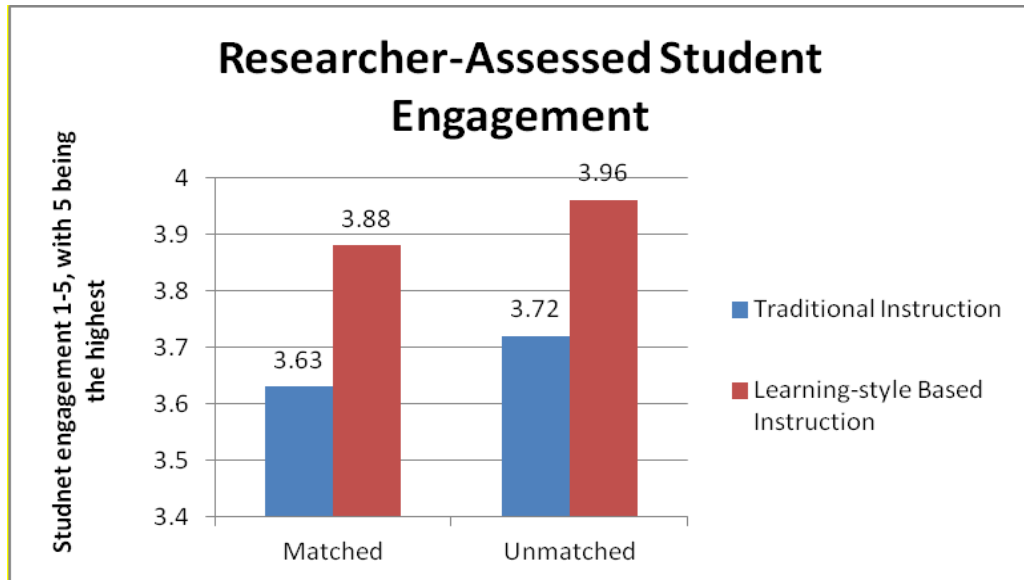


Figure 4. Researcher-assessed student engagement scores, comparing students matched to their learning style preference and those not matched.

During the learning-style based instruction, two objective observers came into the classroom to rate the students' engagement using the same rubric. They were given a seating chart and the rubric in order to facilitate their scoring in spite of being unfamiliar with the students. If they were unsure of a student's assignment or task, they stopped to question them. The observers visited four times during the course of the strategy implementation, and their mean student engagement score was 3.61. This compared to 3.91 scored by the researcher for the same time period. Comparing these scores helped to insure the reliability of the engagement scoring process.

Reading Comprehension

Not only was the researcher observing engagement during this study, but reading comprehension was being analyzed as well. Did the test scores indicate that learning-style based instruction had an impact on reading comprehension? During the traditional unit of study a quiz was given weekly, assessing vocabulary and reading comprehension. The scores on these tests served as baseline data for this study. A quiz was also given weekly during the learning-style based instructional unit, assessing these same skills, using a similar format of multiple choice and short answer. Figure 5 shows the students' test scores on the tests given during the traditional reading instruction unit and the learning-style based instructional unit.

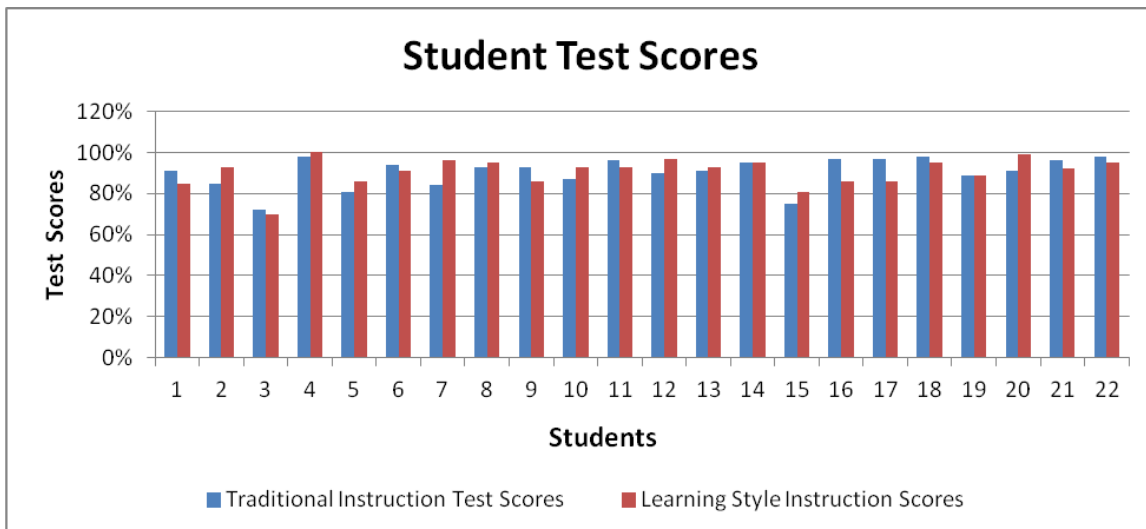


Figure 5. Student test scores for the traditional unit as compared to the learning-style based instructional unit.

The researcher analyzed the change scores between these two tests for each learning style group, both matched and unmatched. When comparing the students' mean test scores from the traditional unit of study with the learning-

style based unit, it was noted that the students improved 1% overall. The mean change score for the matched group was 0.18, with a standard deviation of 6.86. The mean change score for the unmatched group was 0.64, with a standard deviation of 5.8013. Some groups showed significant gains, while others experienced significant losses. The unmatched auditory group and the matched visual learners showed the greatest change using the learning-style based instructional model. The only matched kinesthetic learner moved away during the course of the study, so there are no results for this group. The students who showed strong visual learning tendencies showed the largest change in their scores using the learning-style based instruction. Figure 6 shows the change scores for students showing strengths in each of the four learning styles: Visual, Auditory, Tactual, Kinesthetic.

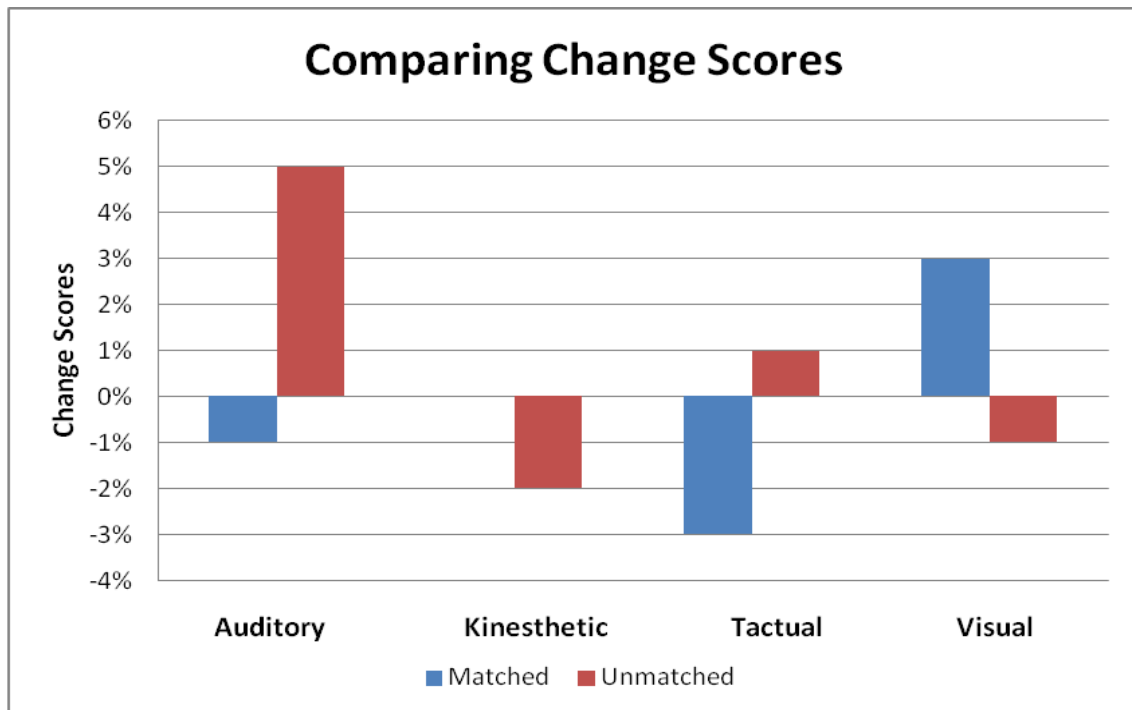


Figure 6. Change scores for each of the learning style groups, matched and unmatched.

Observations

As the learning-style based instruction portion of the study commenced, the researcher noted several things during classroom observations. In the first two weeks of this type of instruction the majority of the students were highly engaged and enthusiastic about the different learning activities. Comments such as these could be heard. "This is so much fun. Can we do it again?" "I've never gotten to do this in school before." "Can I stay in at recess to work on this?" "Can I show the class my work?" "I love what we are doing, but I want to do it more." Not a single student asked to do another group's assignment. However, starting in week three and increasing in week four, several students began asking if they could do assignments given to another group. Even though the activities for each learning style were varied, some students began asking if they could switch groups or assignments. These requests came from both students who were matched to their learning style and those that were unmatched. More students mentioned that they were bored during the last week than at the beginning of the study.

The work produced during the learning-style based instruction was of high quality. Students were very focused and worked diligently on their assignments. On several occasions students would come up with their own ideas for modifying and enhancing the assignments. They were excited when allowed to pursue these options. Three examples of sloppy, hurried work were turned in, and all three were from unmatched students. One student who has regular behavior

difficulties and is on a behavior plan, seemed to benefit from the novel strategies used in the visual group to which he was assigned, even though he was not matched to his dominant learning style. One day he was particularly talkative during a vocabulary activity as he was illustrating the weekly vocabulary words. Upon closer observation, the researcher noted that he was discussing the new words with members of his group, trying to determine if they understood the ideas he was trying to convey. Overall, he was more focused and thorough with his work than during instruction using more traditional methods.

Discussion

Limitations

There were a few events that may have impacted the outcome of this study. The learning-style based instruction took place during the winter, at a time of high absences. During this time period there were a total of 32 absences. Over the course of the traditional unit of study, there were only 21 absences. The matched students missed an average of 1.64 days while the unmatched students missed 1.27. These numbers do not seem significant, but it is a variable to consider.

At the onset of the study, only two students showed that their dominant learning style was kinesthetic. One was placed in the matched group and one in the unmatched group. Prior to beginning the learning-style based instruction, the matched kinesthetic learner moved away to another school district. This made it impossible to analyze the impact of the strategy on a matched predominantly

kinesthetic learner. A larger population in all of the groups would have made the research more effective and the results more substantial.

The researcher noted that the students in the class seemed to tire of filling out the self-assessment as the study progressed. They began to have trouble finding their paper and started filling them out very hastily. This negative attitude toward the instrument may have impacted the results negatively. Rather than being less engaged, the students may have simply become bored with the task of documenting their engagement. The student self-assessment seems to be the least reliable portion of the study and could benefit from enhancement in further research.

The comprehension assessment given at the end of each week was made up of multiple choice and short answer questions. This type of test is aligned with visual learning style and may have favored the visual learners and the instructional strategies implemented with them. This fact may have been reflected in their change scores being the highest. In future studies a test could be devised that addresses the students' specific learning styles, allowing them to respond in keeping with their dominant learning style or a test that contains portions aligned with all four learning styles.

Conclusion

After examining the data acquired in the classroom, the researcher concluded that the learning-style based instruction was only effective for certain students and for limited amounts of time. Just like most strategies used in elementary classrooms, this method can become "old" for certain students. It is

interesting to note that the students strong in auditory learning made the least gains using the learning-style based instruction. Perhaps this can be attributed to the fact that this learning style is accustomed to having their needs met in most classrooms. Many teachers center their instruction towards this learning style. Analysis of the traditional instructional unit revealed that 50% of the lessons focused on auditory learning activities. The visual learning group made the greatest gains during the study. The researcher observed that this group seemed to relish the opportunities to develop their skills in this area, which is often overlooked in classrooms.

While the hard data did not show widespread gains, there were many students who were observed to be more motivated and highly engaged during the learning-style based instructional unit. The positive comments from students, the lack of behavior issues, and the higher quality of work reflected an attitude of high engagement (see Appendix H). These observations suggest that the strategies implemented have benefits in the classroom setting, even if the instruction is not solely centered around learning-style groups.

Throughout the study, four lesson plans were created for each reading instructional period (see Appendices C, D, E, and F). This involved some researching of the various learning styles, planning with content standards in mind, and making the necessary preparations. Often extra supplies had to be acquired for these lessons. Class time was spent instructing each group and guiding them through the steps of their activity. In light of the low gains made using this strategy, careful thought should be given concerning the wisdom of

allocating the extra time and resources needed to maintain it. The research supports Paschler's opinion - "We feel that the widespread use of learning-style measures in educational settings is unwise and a wasteful use of limited resources." (Paschler, 2008, p. 117).

Students are seldom able to have instruction aimed at their dominant learning style in every circumstance, so teachers should help them adapt to learning in other situations as well. "It is recommended that educators use a variety of learning methods, and encourage students to be receptive to different learning methods, rather than try to link specific learning methods to specific learning styles" (Loo, 2004, p. 107). The results of this study showed that the students matched to their dominant learning styles scored no better than the unmatched students. Perhaps it is more beneficial to introduce concepts in a variety of different ways in order to keep instruction fresh and more engaging.

Daniel Willingham is a psychology professor at the University of Virginia. His research focuses on the application of cognitive psychology and neuroscience research to K-12 education. He has been outspoken about debunking the learning style "myth." After examining the existing research on the learning style application in education, he says that "students may have preferences about how to learn, but no evidence suggests that catering to those preferences will lead to better learning." (Rieder & Willingham, 2010) Instead he recommends that teachers should assess and differentiate on the basis of prior knowledge, ability, and student interest. Based on the data accumulated in this study, the researcher would agree with Willingham's assessment.

Further research could be conducted on other ways to differentiate instruction in order to improve student engagement. As Willingham suggests, student ability and interest might be a more effective area to explore. To insure improved reliability in future studies, the student self-assessment of engagement should be reevaluated. Students may also need further explanation on filling these forms out. Improving student engagement is an important goal in the classroom, and more study needs to be conducted on how best to meet this need.

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APPENDICES

Appendix A

INITIAL OBSERVATIONS OF STUDENTS

<u>Student</u>	<u>Observation 1</u>	<u>Observation 2</u>	<u>Observation 3</u>	<u>Identified Learning Style</u>
1	often asks for oral clarification	likes to listen to story		A
2	often asks for oral clarification	talks a lot!		A
3	stands a lot during the day	asks for oral clarification	talks a lot	A or K
4	complains if can't see			V
5	often asks for oral clarification			A
6	draws a lot	wants to "show" the teacher something		V
7	drew pictures on vocabulary assignment	gets the clock to answer time questions		T
8	draws arrays for multiplication	likes to stamp Spelling words		T
9	uses model of clock to set hands			T
10	likes to stamp Spelling words			T
11	likes to draw	papers are very neat		V
12	likes to stamp Spelling words			T

13	likes to stamp Spelling words			T
14	drew arrays for multiplication	does better when using manipulatives		T
15	does better when using manipulatives	asks for oral clarification		T or A
16	moves around often	rearranges and organizes desk/room		K
17	struggling with 9's hand trick	not a good listener		V
18	likes to stamp Spelling words			T
19	draws a lot	very concerned with appearance		V
20	draws on papers	not a good listener	stands a lot	T or K
21	wants to sit at the front of the room	draws diagrams on papers	stands or rocks in chair	T or K
22	draws a lot	brings a lot of things for show and tell		V
23	complains if can't see	draws a lot if given the chance		V

Notes: Abbreviations: V – visual, A – auditory, T – tactual, K – kinesthetic

Appendix B

Name: _____					
Date: _____					
How engaged are you? 1 is low and 5 is high.					
Checkpoint #1—	1	2	3	4	5
Checkpoint #2—	1	2	3	4	5
Checkpoint #3—	1	2	3	4	5
Checkpoint #4—	1	2	3	4	5
Checkpoint #5—	1	2	3	4	5
<ul style="list-style-type: none">• What are you thinking about the lesson?					

Appendix C

Learning-style Based Instruction Lesson Plans – Week 1

Week 1	All	Visual	Auditory	Tactual	Kinesthetic
Monday	Introduce vocabulary	Illustrate vocabulary words, using box paper.	Write song or rap with vocabulary words. Perform for class.	Illustrate vocabulary words with clay. Take a photo.	Play Charades with vocabulary words with group.
Tuesday	Read Dogzilla, pgs. 310-319.	Use yellow strip to follow along while reading with group.	Listen to CD of story. Use spinner with questions to discuss	Use finger to follow along while reading with group.	Sit on beanbags to read together.
Wed.	Review story elements with Promethean lesson. Esp. character.	Graphic organizer over characters.	Work with a partner to "interview " one of the characters.	Make a puppet of story character, holding item from story.	Use hula hoops and sticky notes to compare dog and mice.
Thursday	Review story elements - especially setting.	Draw an illustration of the story's setting.	Write a poem or song describing the setting.	Make a jigsaw puzzle illustrating the setting.	Make a skit to perform for the class, having character describe the setting.
Friday	Take vocabulary & comprehension quiz. Sequencing activity.	Make a comic strip showing the story elements.	Write a diary entry telling about the events of the story.	Put picture of story events on a time line.	Retell story using hand signs. Model for the class.

Appendix D

Learning-style Based Instruction Lesson Plans – Week 2

Week 2	All	Visual	Auditory	Tactual	Kinesthetic
Monday	No school.	No school.	No school.	No school.	No school.
Tuesday	Introduce vocabulary Spelling word work	Use Frayer model to illustrate vocabulary words.	Write a letter to a friend using all of the vocabulary words.	Play Memory game with word & definition cards.	Devise hand signs for each vocabulary word. Teach them to the class.
Wed.	Introduce "Mysterious Giant of Barletta" by slicing and passing around onion. Read pgs. 341-345.	Use yellow highlighters to read story with group.	Listen to story. Write a review question over story.	Follow along with finger as you finish reading story.	Lay on the floor while you finish reading the story.
Thursday	Review Problem & Solution with Promethean.	Draw a picture of the problem & solution.	Write a letter to your friend telling them about the problem and how it was solved.	Fill out graphic organizer over Problem & Solution.	Act out the Problem and Solution from the story. Perform for the class.
Friday	Take quiz over story.	Make a sequence flipbook of the story.	Interview one of the characters and perform for the class.	Make a story road with the story elements.	Make up a different ending to the story and act it out for the class.

Appendix E

Learning-style Based Instruction Lesson Plans – Week 3

Week 3	All	Visual	Auditory	Tactual	Kinesthetic
Monday	Introduce vocabulary	Illustrate vocabulary words, using box paper.	Write song or rap with vocabulary words. Perform for class.	Illustrate vocabulary words with clay. Take a photo.	Play Charades with vocabulary words with group.
Tuesday	Read Raising Dragons, pgs.	Use yellow strip to follow along while reading with group.	Read story together .	Use finger to follow along while reading with group.	Sit in hallway to read together.
Wed.	Review cause & effect with Promethean lesson.	Graphic organizer over cause & effect.	Pass out strips of cause and effects. Read and match with partner.	Match cause & effect strips; glue onto construction paper.	Act out some examples of cause and effect.
Thursday	Review cause & effect.	Make flip book of cause & effect from story.	Work with a partner to "interview " one of the characters .	Make cause & effect strips over story events.	Make a skit to perform for the class showing cause & effect from the story.
Friday	Take vocabulary & comprehension quiz. Sequencing activity.	Make a comic strip showing the story elements.	Write a diary entry telling about the events of the story.	Put picture of story events on a time line.	Retell story using hand signs. Model for the class.

Appendix F

Learning-style Based Instruction Lesson Plans – Week 4

Week 4	All	Visual	Auditory	Tactual	Kinesthetic
Monday	Introduce vocabulary words & author.	Students pick a voc. word and draw it on their board. Others guess.	Write clues for the vocabulary words. Take turns choosing clue & guessing word.	Use letter tiles to make vocabulary words and use in sentence.	Make hand signs for vocabulary words & teach class.
Tuesday	Read story pgs. 397-405. Finish reading with group. Give opinion: Did Fritz really become a duck?	Finish story with group of 3 and discuss question.	Read with a partner and discuss question.	Finish story with group of 3 and discuss question.	Read on bean bags. Discuss question.
Wed.	Read pgs. 416-419. Review nonfiction reading.	Make a word web with information about VAnAllsburg.	Interview VanAllsburg and perform for class.	Compare & contrast illustrations in 2 Van Allsburg books with Venn Diagram.	Act out what could happen in a sequel.
Thursday	Review story elements.	Make a sequence flipbook of the story.	Make a list of do's and don't's for someone taking care of Fritz.	Make a story road with the story elements.	Make up a different ending to the story and act it out for the class.
Friday	Take quiz over story.	Use Venn diagram to compare & contrast the illustrations in 2 Van Allsburg bks.	Write a letter to Van Allsburg about the book.	Select a picture from the story and try to do one similar, using pencil/paper.	Interview the author with a partner, asking him about writing this story.

Appendix G
Engagement Rubric

Engagement Score	Student Behavior
5	Students take full ownership of learning activities, displaying high levels of energy, a willingness to ask questions and pursue answers.
4	Students begin taking ownership of learning activities. Their involvement shows concentration and effort to understand and complete the task.
3	Students participate in learning activities and stay on task without teacher intervention. However, their work has a routine or rote quality and significant thought or commitment to quality is not evident.
2	Students follow directions in a rote or routine manner. Attention may be mildly distracted and they may need some added teacher attention or direction to remain on task.
1	Students' attention and participation fluctuates. They may be easily distracted and require teacher intervention to stay on task.

Appendix H

Student work sample of graphic organizer created following author study.

