IMPROVING VOCABULARY ACQUISITION WITH MULTISENSORY INSTRUCTION

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An Action Research Project Submitted to the Graduate Faculty of the School of Education in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Teaching and Leadership

Saint Xavier University
Chicago
May 2007

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Abstract

The purpose of this action research project was to improve student vocabulary acquisition through a multisensory, direct instructional approach. The study involved three teachers and a target population of 73 students in second and seventh grade classrooms. The intervention was implemented from September through December of 2006 and analyzed in January of 2007. The goal was to gather evidence of a marked improvement in the number of vocabulary words that students recognize, understand, and use. Pre and posttests gathered data on student knowledge of fifty key content area vocabulary words. Three interventions based on brain research were implemented: specially designed graphic organizers, classical music, and Brain Gym® exercises. The gathered data indicates that students clearly understood and could define over five times as many words after this intervention (from 378 words to 1,941 words). The project results show that a multisensory, direct instructional approach improves student vocabulary acquisition. Educators need to increase their knowledge of brain research and implement direct instruction of vocabulary through the use of multisensory methods.
(Contains 10 figures, 34 references, and 11 appendices)

CHAPTER 1

PROBLEM STATEMENT AND CONTEXT

General Statement of the Problem

The ability to unlock the meaning of unknown words is a necessary skill in strengthening reading comprehension. Improved reading comprehension will positively impact overall academic success and will develop skills for real world applications. Evidence from various standardized tests and teacher researcher observations indicates that vocabulary knowledge is weaker than desired in the students of the targeted seventh and second grade classrooms in the three target schools.

Immediate Problem Context

Three different schools located near a major metropolitan area were involved in this research project. Site A and Site B are middle schools from the same suburban community and Site C is an elementary school from another suburban community. Statistics in the next sections are taken from the State School Report Card for 2005.

School A

School Site A is structured as a middle school (grades six through eight) and the total number of students enrolled is 985; of these students, 91.1% are White and 1.3% are Black. The school population is comprised of 92.5% students from middle to upper income households and 7.5% of students from low-income households (eligible to receive free or reduced-price lunches). The low-income student population is higher than for the rest of the district (5.1%). The limited-English proficient population stands at 1.7%. The attendance rate is 95.8% with a mobility rate

of 8.9% and there are no chronic truants. The average class size is 24.1 students and 100 minutes per day are devoted to language arts instruction (State School Report Card, 2005).

The staff includes 72 full-time teachers, a principal, and an assistant principal. As a middle school, each grade level is divided into two academic teams, which consist of a teacher team leader and from five to nine team teachers, plus a full-time special education teacher who is attached to each team. There is a full-time librarian and two library aides, a full-time reading specialist, and three computer labs staffed by a full-time computer lab aide. There are two full-time guidance counselors, a full-time social worker, a part-time student assistance coordinator (a resource for students with at risk behaviors), a part-time psychologist, two part-time nurses, in addition to a full-time English Language Learner (ELL) teacher and ELL aide. The staff includes three special education teaching assistants, five special education inclusion assistants, as well as a part-time speech teacher and a part-time hearing teacher.

The facility was once the community high school and was built in 1926 with several additions put on over the ensuing 79 years. Teams of students are spread out across the first and second floors and among three wings. There is a full-size gymnasium with locker room facilities and a full-size cafeteria, in addition to a new library that was built as part of an addition in 2001. There are three computer labs holding approximately 30 networked computers each and the school has added two class sets of Computers On Wheels (COWs). Two mid-sized multi-purpose rooms are used for various meetings, team assemblies, and drama productions. A variety of after-school clubs and sports teams are offered, including a Team Homework Helper, a Book Club, Drama Club, and Teachers Encouraging Kids (TEK).

The district curriculum determines the scope, texts, and standards to be covered at each grade level. Content area teachers at both the team and grade levels meet to coordinate and

implement the district curriculum. The language arts curriculum uses a two-period block that is structured into "modules" that encompass both reading and writing skills. At this point there is little integration between content area subjects. The curriculum is currently going through major changes to address the ongoing need to improve state test scores. Traditional and current district initiatives encourage the philosophy and use of teaching methods designed around cooperative learning, multiple intelligences, and backwards planning.

Eighth grade State Standards Achievement Test (SSAT) scores for reading for the academic year 2004-2005 stand at 87.6 % of students who met or exceeded the state standards. This score is lower than the district score of 89.9% but significantly higher (6%) than the previous year's score. Nevertheless, overall scores have remained in the same basic range for many years. State Annual Yearly Progress (AYP) was met at all levels. AYP requires 47.5% of all students to meet or exceed state standards (State School Report Card, 2005).

School Site A has been promoting extensive use of seven cognitive reading strategies for the last several years. It was the first of the district's middle schools to create and fill the position of reading specialist to address the needs of struggling readers. Improving reading comprehension has been a focus and an included piece of the School Improvement Plan Goals (SIP) for several years. This goal directly links to the state's mandatory School Improvement Plan Goals. Staff development in reading strategies has been required for many years and additional training is offered on institute days, at after-school sessions, at conferences, and in summer classes. Posting and use of the strategies is required in all classrooms, so the focus is consistent throughout the school, not just in the language arts classrooms; however, stagnant reading scores on state tests remain.

Recently the School Improvement Plan Committee (SIP) has placed a new focus on improving stagnant reading scores by addressing vocabulary building skills. Key areas of vocabulary building that have been examined include: etymology of words, context clues, and visual cues. Thus, a research project that guides the design of an intervention to address vocabulary building skills is a timely connection to School Site A's current learning focus. The ultimate purpose, however, is to develop a plan that will improve the vocabulary acquisition skills of students and thus their overall reading comprehension skills. Research supports that improved reading comprehension connects directly with overall student success in academics across all grades K-12 (Baker, Simmons & Kameenui, 1995). Improving vocabulary skills should improve test scores, but much more importantly, the success of a vocabulary intervention based on this action research project will enrich the lives of students by truly opening wide the doors to academic success and lifelong learning.

School B

School B is a large middle school in a suburb outside a major metropolitan area. The total school population is 1,192 students. There are three grade levels that include sixth through eighth grades with three academic teams at each grade level. The ethnic background of 87% of the student body is White. There is little diversity within the population of School B with only 1% of students who are Black, 7% percent Hispanic, and 4% of Asian ethnicities. The student population of School B consists of 92.2% of students who come from middle to upper middle income households and 9.1% of students from low-income households (therefore eligible to receive free or reduced lunches), which is higher than the district percent (5.1%). The limited-English proficient population at 0.2% is lower than the district percent (1.2%). The attendance rate is 95.5% with a mobility rate of 4.9% and the chronic truancy rate is less than one percent.

School B has average class sizes of 21.4 students and 100 minutes per day are spent in language arts classes (State School Report Card, 2005).

The staff includes 85 full-time teachers, a principal and two assistant principals. Aligning to the middle school concept, each grade level is divided into teams. There are three teams per grade level with a teacher team leader and usually five to nine team teachers. There is a full-time special education teacher assigned to each team. There are two full-time librarians, three full-time library aides, a full-time reading specialist, and four computer labs each staffed with a full-time computer lab aide. There are three full-time guidance counselors (one assigned to each grade level), a full-time psychologist, a part-time student assistance coordinator (a resource for students with at risk behaviors), two part-time nurses, as well as a part-time English Language Learner (ELL) teacher. The staff includes five special education teaching assistants, eight special education inclusion assistants, and a full-time speech and language teacher.

School B is a large campus that was built in 1998. The layout of the building was designed to meet the middle school concept of having a pod of grouped classrooms for each academic team. There are two-full sized gymnasiums and one weight room, all with locker room facilities. There is a full-size cafeteria with an outdoor area for students to utilize. School B has an extensive library with quiet reading areas and classrooms used for various purposes. There are four computer labs with about 30 to 40 networked computers each. The school also has three class sets of COWs (Computers On Wheels). School B was built with architecture that aligns with the middle school concept which includes many contemporary attributes. There are several multipurpose rooms used for various purposes like faculty meetings, presentations, and team activities. A unique attribute is the Black Box Theatre for drama productions. There is a variety of after-school clubs and athletic teams offered, including Homework Club, Math Counts,

Rocket Club, Share and Care Club, Drama (which produces three plays each year), and Teachers Encouraging Kids (TEK).

The district maintains a standards-based curriculum that determines the scope and sequence taught at each grade level. There are many opportunities for content area teachers, at both the team and grade level, to meet, collaborate, and implement the district curriculum. The language arts curriculum is structured with a two-period block that allows for genre study modules that encompass both reading and writing skills. Because the middle school philosophy encourages content area integration, some teams do collaborate to integrate curriculum. In order to continue improving state test scores, the district embraces the use of teaching methods designed around cooperative learning, multiple intelligences, and backwards planning.

Eighth grade SSAT scores for reading for the academic year 2004-2005 stand at 88.9% of students who met or exceeded the state standards. This score is higher than the district (83.5%) and 3.5% higher than the previous school year. State Annual Yearly Progress was met at all levels (State School Report Card, 2005).

While School B's state standardized test scores were for the most part quite good, the district would like to see them always improving. One area of concern for the district and this school is that students have weak vocabularies. Improving vocabulary development is in the School Improvement Plan. Over the last four years, with the addition of a new reading specialist, School B has been diligently addressing issues of reading comprehension. There has been the addition of a reading lab classroom and “Literature Closet” structured with a reading specialist to provide support to struggling readers. Staff development in reading and vocabulary strategies has been required and provided through additional training opportunities on institute days, monthly faculty meetings, conferences, and summer classes. School B has seen a marked improvement in

reading comprehension and SSAT test scores; however, additional improvement is desired. There is a focus to improve vocabulary acquisition, not only through instruction in language arts classes, but in all content area classes. The opportunity to research this area of concern will be a welcomed intervention towards School B's learning goals. Improved vocabulary development will strengthen reading comprehension resulting in academic success.

District A/B

Schools A and B are a part of a unit district that contains twelve elementary schools, three middle schools, and two high schools with a total enrollment of 13,325 students, 87.7% of whom are White, 6% Hispanic, 4.2% Asian, and 1.5% Black. The district employs 782 teachers, 99.2% of whom are White. Female teachers make up 76.4%, male 23.6%. The average teacher's salary is $52,502 and the average administrator's salary is $95,720. Average years of experience stands at 10.9 years and 56.8% of the district's teachers hold their master's degree or above. The per pupil expenditure for school year 2003-2004 was $4,654 (State School Report Card, 2005).

The district is currently undergoing an extensive restructuring under a new superintendent. Many administrative positions have been added, including a Literacy Coordinator and a Gifted/Talented Coordinator, both of whom are under the Assistant Superintendent of Learning and Teaching.

Community A/B

Schools A and B are situated in the same community. Target Community A/B covers about 15.9 square miles and is centrally located in an outer suburban ring of a major metropolitan hub. This small city has a population of 31,834 (Special Census, September 2003) and is expected to grow 15.9% over the next five years. Community A/B sits close to major rail and highway transportation systems including a small regional airport. It is home to a variety of

businesses that include manufacturing, retail, and service industries, which support its tax base. The median household income is $88,635. The community promotes the arts, education, sports, healthcare, and recreation (Community Profile, October 2005).

While SSAT scores are above the state level, they are not at the level that the local school board demands. The community is fairly affluent with a large population of parents who are professionals. The community also has a long tradition of holding high expectations for the quality of its local school system. While it is proud of its schools, the community feels that the school system is not performing at the level of excellence that is desired. There are strong forces at work making sweeping changes to radically improve test scores.

School C

School C is a two-year-old elementary school enrolling students in Early Childhood, Pre-K, and grades K-6. The total enrollment is 610 students. The student population is very diverse. Twenty-five percent of the students are receiving free or reduced lunch. The ethnic background of the students consists of 39% White, 5% Black, 40% Hispanic and 13% Asian. The school houses one additional section of each at grades K-4 of English Language Learners (ELL). The average class size is minimally higher than the district and state averages due to new home development. The attendance rate is above the district and state at 96%. The mobility rate is at 12%, which is 4% below the district and state, and there are no chronic truancies.

The staff includes 36 full-time teachers. If a classroom has 32 or more students, a classroom assistant is assigned. There are assistants in the Early Childhood and Pre-K classrooms, as well as in the two second grade classrooms. There is one principal, three secretarial staff, one bilingual liaison, and one librarian. School C has a service team that works with the K-6 teachers and is comprised of one social worker, one nurse, one psychologist, one

speech teacher, one occupational therapist, one special education resource teacher, and a special education coordinator. Students who qualify for an Individual Education Plan (IEP) receive services from this team throughout the school year.

The school is organized around two major programs (Early Childhood and K-6) with one principal. The building houses one library, one computer lab, one gymnasium, one art room, one music room, and one cafeteria. A reading room was established to support guided reading for small group instruction. There is an after-school Homework Club that is well attended.

The curriculum is determined by the district, but offers a flexible process to allow for differences by the individual site. The District Curriculum Roadmap and their School Improvement Plan drive each site's vision.

The standardized test scores for School C are meeting AYP, but there are some concerns with the SSAT third grade reading scores. There were 60% of the students meeting or exceeding compared to the district score of 61% and the state's 66%. The fifth grade results show 60% meeting or exceeding compared to the district at 57% and the state at 59% (State School Report Card, 2005). Although the fifth grade scores are a little above the district and state, it is the school's goal to increase the SSAT reading scores at both grade levels. The staff at School C has included a focus on vocabulary in the School Improvement Plan (SIP), and the district has included a focus on vocabulary in the District Curriculum Roadmap.

School Site C is currently developing their first School Improvement Plan based on first-year test results. The staff has developed two goals for the school to focus on until the plan is completed. The goals are to strengthen nonfiction reading strategies and implement the content area vocabulary lists developed by the district. The students in grade K-2 have been assessed using the State Snapshot of Early Literacy (SSEL). This test gives the teacher a breakdown of

student scores in the areas of vocabulary, spelling, word recognition, fluency, and a writing extension. It is administered three times a year for lower-achieving students and twice a year for the others. The district has posted valuable resources on its website to provide additional support to their teachers on best practice in vocabulary instruction. It is clear this district values the importance of enriching children's vocabulary. This action research project aligns directly with district initiatives.

District C

This district is made up of 53 schools, including 40 elementary schools, 8 middle schools, 5 high schools, and 1 alternative high school with a total enrollment of 38,429 students. The ethnic population consists of 46% White, 38% Hispanic, 7% Black, and 7% Asian. The district employs 2,265 teachers, 86% of whom are White and 12% of whom are Hispanic. Female teachers make up 78.5% of the staff and 21.5% are male. The average teacher salary is $57,945. The average teaching experience is 14 years, 41% with bachelor's degrees and 58% with master's degrees. There are 113 school-based administrators with an average salary of $102,980. The per pupil expenditure for school year 2003-2004 was $4,794 (State School Report Card, 2005). The students come to the classroom with backgrounds representing over 60 cultures making the schools rich with ethnic, cultural, and socioeconomic diversity, mirroring the global society to which the students will contribute their skills.

The district is in its second year with the current superintendent. There are many changes being made, including boundaries and finances. This has drastically changed the student population at some schools and there have been many financial cuts affecting class size and electives in the middle and high schools. Three new elementary schools, one middle school, and one high school opened in the past two years.

Community C

School C is in a different community from Schools A and B. It is located within the township of a major suburban area. The district covers 90 square miles and serves portions of 11 communities in three different counties. These three counties are easily accessible from major interstates and commuter trains. The children at School C come from two different neighboring cities. After a major boundary shift in the district, many families chose to keep their children enrolled in private schools. Due to growth in housing and this school's positive reputation, enrollment has increased in its second year of operation. There are no sidewalks leading to the school, so all students have bus service available to them. Some families choose to drive their children, but the majority of students utilize the school bus. The school resides in a city that has a high Hispanic population. The median household income in this city is $52,605 (2000 census, U.S. Census Bureau). Since there are many schools in a large demographic area, each school addresses different school issues with various levels of parental involvement.

National Context of the Problem

Research shows a relationship between weak vocabulary skills and poor reading comprehension. Results of research dating as far back as the 1940's remain unchanged (Baker, Simmons & Kameenui, 1995). Current research and teacher observation continue to support the belief that students who have weak vocabulary skills struggle with overall reading comprehension.

> Current and past research points to the critical role limited vocabulary plays in the struggles of our lowest achieving readers, from primary to secondary grades. 'We use words to think; the more words we know, the finer our understanding is about the world'

> (Stahl, 1999). Or more specifically, the more words our students know, the better their comprehension about what they read about the world. (Honig & Diamond, 2004, p. 1)

There is little debate that weak vocabulary acquisition is a national problem in education today. In fact, the debate centers on the best method of delivering vocabulary instruction. Research shows there is no one method that is significantly more effective than another (Baker, Simmons & Kameenui, 1995). However, there is evidence that indicates direct instruction does improve vocabulary development (Baker, Simmons & Kameenui, 1995).

> Should the teacher teach vocabulary directly or incidentally? That is, should words be targeted for the learners or should they develop naturally through reading and the learners' desire to clarify concepts? Evidence falls in both directions. Certainly vocabulary knowledge can be acquired through reading and discussions about certain contexts (Nagy et al, 1985). But it appears that direct instruction is more effective than incidental learning for the acquisition of a particular vocabulary, and also more efficient (McKeown and Beck, 1988). (Smith, 1997, p. 2)

Research shows that a lack of progression in vocabulary development in the primary grades results in poor reading comprehension in secondary grades (Honig & Diamond, 2004). Poor reading comprehension negatively impacts success in school and scores on standardized testing. In addition, it affects both receptive and expressive language skills (listening, speaking, reading, and writing). Ultimately it can affect future experiences (Condis, Parks & Soldwell, 2000).

CHAPTER 2

PROBLEM DEFINITION

Evidence of the Problem

The teacher researchers who conducted this investigation have long held concerns about student reading comprehension. Indeed, the administrations of all three school sites have analyzed standardized test scores from recent years to identify areas of needed improvement in reading comprehension. Although many instructional methods to strengthen reading strategies have been put into place at all three schools, scores are still in need of improvement. Through evaluation of various standardized testing in reading (SSEL, SSAT, Tungsten) the administrations at all three school sites have identified vocabulary as an area of focus. Two sites have included improving vocabulary acquisition in their schools' School Improvement Plans (SIP). The teacher researchers have also observed evidence of vocabulary weakness in general writing skills and in assessments such as content area tests, spelling, vocabulary tests, etc.

Thus, the purpose of this action research project was to improve the vocabulary acquisition of the students in the three target classes. The teacher researchers administered the intervention during class time to 73 students during the fall of 2006 in two seventh grade classrooms and one second grade classroom at the three target school sites.

Strategy Surveys

During class time of Week One of the research period the teacher researchers gave a pre-survey of vocabulary strategies (Appendix A1) to all students involved in the intervention. The purpose of this survey was to gather information on just what vocabulary strategies were being

actively practiced by students. Seven strategies were selected that readers commonly use when they encounter an unknown word. In December 2006 teacher researchers gave a post-survey (Appendix A2) of the same strategies, and in January they compiled and compared the results of both surveys to analyze the data for any improvement. The survey required students to rate their use of each strategy as "often," "sometimes," or "never."

The strategy pre-survey results (Figure 1) indicate that most students are aware of many of the key strategies and use them at least some of the time. The combined results show that the target students are weak in the use of some key word strategies used in improving vocabulary acquisition; yet the data also show areas of strength, which makes it difficult to discern a common pattern. The data show that there are a significant number of students who “never” use Strategies 2, 3, 4 and 5—anywhere from 26% to 34%. The results of students who chose the “often” response for Strategies 3 and 4 are also fairly strong (29% and 38%) compared to the other strategies. The data on Strategy 1 denotes that a considerable number (93%) of students either “often” or “sometimes” use this key strategy. In addition, the results show that 84% to 86% of students “often” or “sometimes” use Strategies 6 and 7. A solid 41% of students responded that they use Strategy 1 “often”, while 48% of students responded that they use Strategy 6 “often.” Strategy 7 results show some strength as 37% of students responded that they “often” use this strategy.

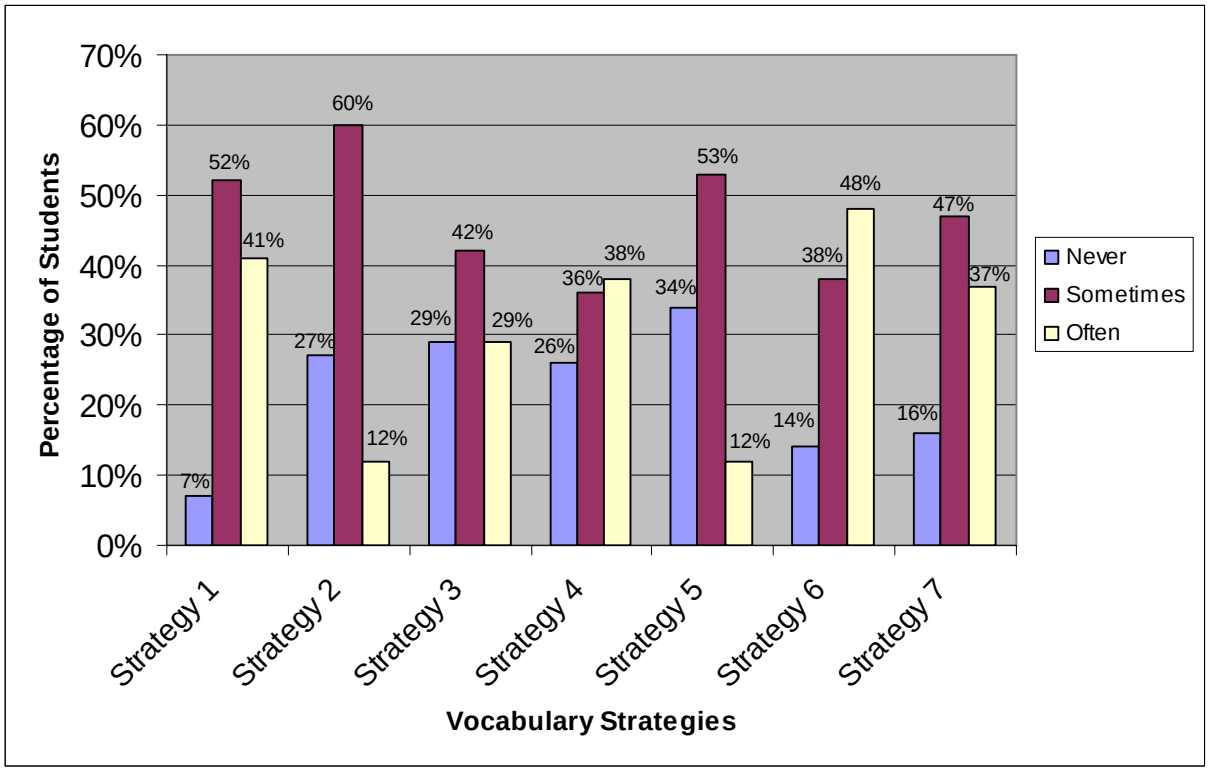


Figure 1. Results of pre-survey of common word strategies used by students

Strategy 1 I sound out the word.
Strategy 2 I chunk the word into parts, looking for smaller words I know.
Strategy 3 I use the picture to help me understand the word.
Strategy 4 I create a picture in my mind.
Strategy 5 I make a connection to another word or idea I do know.
Strategy 6 I read around the word to look for clues.
Strategy 7 I think back to what happened before and decide what makes sense.

Vocabulary Assessment

In addition, during Week One, after the administration of the pre-survey, the teacher researchers administered a pretest (Appendix B1) of a master list of 50 teacher-selected academic vocabulary words that were age appropriate for each class. The words were chosen from Latin and Greek stems (driven by SSAT lists) for Sites A and B, and from the district's content area vocabulary list for Site C. The purpose of the pretest was to gather data on students' knowledge of the selected key vocabulary so that the posttest data could track any growth in understanding of truly unknown words. Then five-word weekly pre and posttests (Appendices

C1 and C2) were given with words taken from the master list of 50 words (Appendix D). The purpose of the weekly tests was to break up the master list so that it was more attainable for students. The weekly posttests also provided formative assessment feedback for the teacher researchers' direct instruction, as well as increased student awareness of their learning. The teacher researchers administered the pretest of the master 50-word list in September and administered the posttest (Appendix B2) in December at the end of the intervention period. Weekly pre and posttests were given during ten separate weeks between the months of September and December of 2006.

Teacher researchers also decided to assess the accuracy of student word knowledge. An assessment scale was developed to evaluate the level of understanding of the word definitions students wrote in the last column of the pretest. The assessment scale evaluated whether the student responses showed a “clear understanding” of the word (2), “some understanding” of the word (1), or “no understanding” or no attempt at the word (0). Teacher researchers then evaluated every word definition on every pretest and posttest using this scale. All student and teacher data were compiled and analyzed in January of 2007.

The results of the master vocabulary pretest (Figure 2) shows that 27% of students felt they “know” and could define the meanings of the teacher-selected words, and an additional 10% felt they could “guess the meaning.” When teacher researchers, however, evaluated the student level of understanding, they discovered a huge gap. Figure 3 shows that 27% of students felt they “know” the words, while teacher researcher evaluation shows only 10% actually demonstrated a “clear understanding” of these words; an additional 11% had at least “some” weak understanding of the words. A large number of students (43%) responded that they had “never heard or seen” this word before. In addition, the teacher researcher analysis shows that 79% of students either

attempted to define the word and were totally incorrect, or did not attempt to define the word at all.

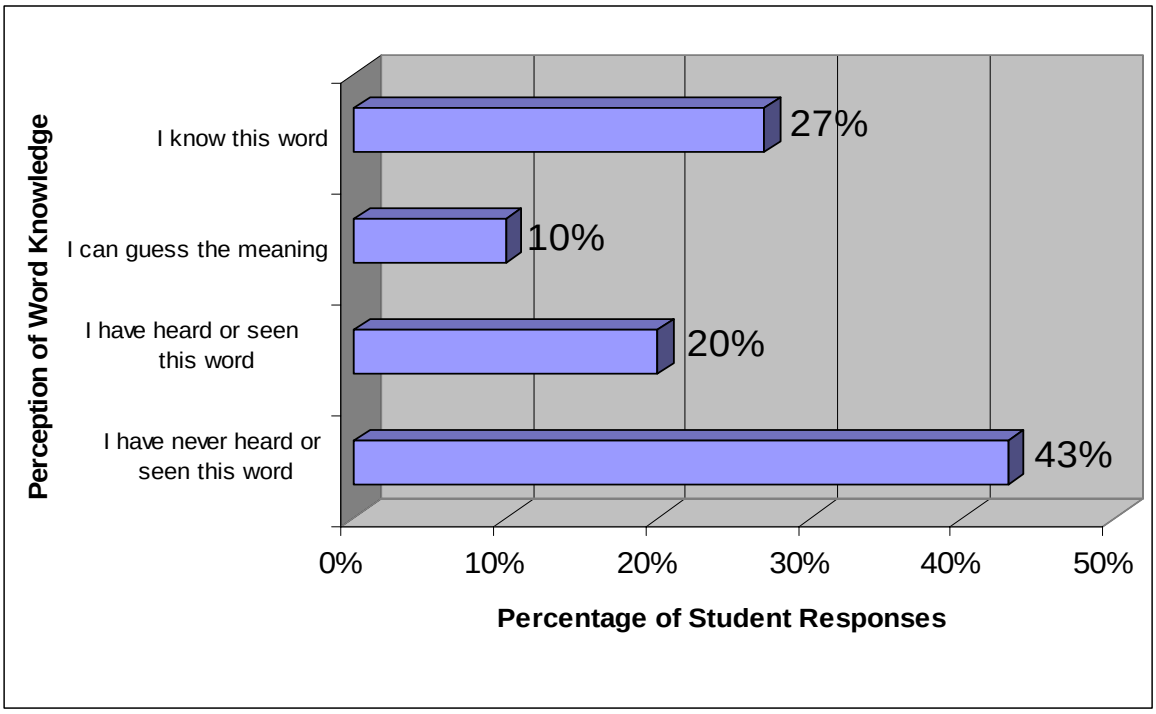


Figure 2. Results of student perceptions of word knowledge

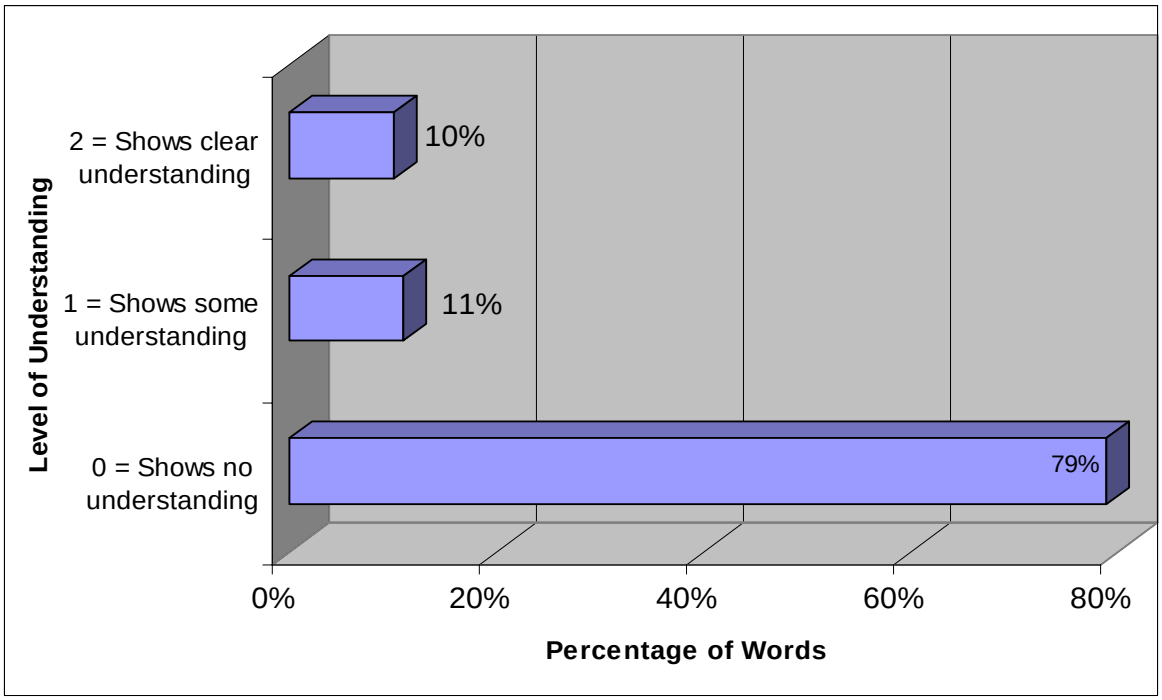


Figure 3. Results of teacher assessment of word understanding

Reflection Journal

In December students were also required to respond to a reflection journal with an attitude scale (Appendix E) which contained key questions about the three interventions. In addition to responding to the journal stems, students were required to rate each intervention as: 1) Didn't help me at all; 2) Helped me some; or 3) Helped me a lot. The purpose of the journal reflection was to gather student feedback on whether the interventions engaged their interest and if they felt it actually helped their learning and retention of the selected vocabulary. Responses were read, tallied, and analyzed by teachers in January and commonalities were recorded.

Teacher Field Notes

Teacher researchers kept weekly field notes (Appendix F) throughout the intervention. The purpose of the field notes was to gather the teacher researchers' observations on the strengths and weaknesses of the ongoing interventions and any other interesting findings. They also were necessary to record any needed short-term modifications, as well as any recommended long-term alterations.

Probable Causes from the Literature

The Effect of Socioeconomic Factors

There are various possible reasons for weaker than expected vocabulary scores at each school site. It is widely acknowledged that low socioeconomic status has a huge negative impact on vocabulary scores. Poverty, even when other factors are equal, negatively impacts vocabulary acquisition (Baker, Simmons & Kameenui, 1995; Biemiller, 2000; Marzano, 2004). In single parent families, as well as in those families where both parents work, there is less of the rich conversation time between children and adults that supports growth in vocabulary (Collins,

1999). In these same families there is also less adult supervision of children's overall reading and time spent on academic studies (Collins, 1999).

Television and Other Factors Outside of Educator Control

There are certain factors that affect student vocabulary acquisition that is beyond the control of schools and teachers. The amount of time spent watching TV and playing with other video sources (video games, computer games, etc.) has increased dramatically (Collins, 1999). There also exists a growing push towards involvement in multiple extracurricular activities--very prevalent in socioeconomically *advantaged* communities. Children (poor or not) are not spending as much time reading as have previous generations (Collins, 1999; Marzano, 2004). Research points to a link between a drop in time spent watching television and an improvement in reading scores (Collins, 1999).

Less Time on Direct Instruction

Also, teacher researchers have observed in their own districts that due to the time restraints of increasingly detailed curriculums and changes in curriculum focus, teachers do not spend as much class time on direct instruction of vocabulary. This lack of direct instruction in vocabulary is noted in several studies, among them Biemiller, 2000 and Marzano, 2004. At the same time, research supports that direct instruction of vocabulary does improve vocabulary acquisition (Baker, Simmons & Keemanui, 1995; Marzano, 2004; Smith, 2004).

Teaching Methods and Brain Research

Not only has there been a lack of direct instruction in vocabulary, but teachers may also not be using instructional methods that aid students in learning and retention. Educators such as Patricia Wolfe (2001), Eric Jensen (1998), and Marilee Sprenger (1999) have carefully connected “best practice” instructional methodologies to recent brain research: “The more we

understand the brain, the better we'll be able to design instruction to match how it learns best" (Wolfe, 1998, p. 1). As the technology to investigate the brain continues to become more sophisticated, there will be a profound impact on instructional practice in the nation's classrooms.

Conclusion

Overall it is clear that the students of sites A, B, and C are not making efficient and consistent use of common strategies to figure out the meaning of unknown vocabulary. In addition, they are misjudging their own level of knowledge of the words that they do encounter.

At Sites A and B the teacher-selected words were a combination of key content area vocabulary that was cross referenced to the most common Greek and Latin roots and affixes covered on SSAT tests. At Site C the selected words were based on the required district content area vocabulary. All three teacher researchers believe that a weakness in the knowledge of these pre-selected words negatively impacts comprehension of texts used in science, social studies, language arts, and math classes. In addition, teacher researchers assume that weakness in the roots embedded in these words would also show up as a weakness in SSAT scores that include vocabulary assessment.

CHAPTER 3

THE SOLUTION STRATEGY

Literature Review

Research indicates that over the past ten years there has been a great deal of work done to understand what is happening in the brain and how the brain learns best. There is a need to get this recent research into the learning theories of teachers and schools (Jensen, 1998). New information initially enters the brain through the senses and then moves into working memory (Jensen, 1998; Sprenger, 1999). Unless connections and rehearsal take place, working memory prunes out certain information as unimportant; thus learning never does reach permanent memory where it can be accessed and used (Jensen, 1998; Sprenger, 1999; Wolfe, 2001). Also, contrary to earlier beliefs, memory is not confined to one area of the brain, but the process of creating and maintaining memory activates multiple areas of the brain (Sprenger, 1999). Sprenger (1999) believes that research currently supports five different memory pathways: semantic, episodic, procedural, automatic, and emotional. This information has many implications to change the methods teachers use to enhance student learning. "The greater the number of links and associations that your brain creates, the more neural territories involved and the more firmly the information is woven in neurologically" (Jensen, 1998, p. 92).

Teachers will often be heard complaining that students today are just not paying attention. But Wolfe (2001) says, "There is no such thing as not paying attention; the brain is always paying attention to something. What we really mean is that the child or student is not paying attention to what we think is relevant or important. Attention, as all of us know, is selective" (p. 81). She promotes using novelty of all kinds to act as an attention-getter for the

brain. Many researchers have now investigated the ways the brain encodes information. This research has led them to promote the use of techniques that appeal to multiple senses, repetition (sometimes called rehearsal), and engaging positive emotions (Fishback, 1998-1999; Sprenger, 1999).

In addition, learners need to have a broad base of background knowledge available to them to be able to figure out new learning. This skill is essential to improving vocabulary acquisition (Marzano, 2004). Students need to be able to develop this background knowledge so they have this connection to new learning and thus be able to access and maintain that new learning (Marzano, 2004).

Visuals

Several studies validate how well the mind processes and remembers visual information (Sprenger, 1999). The use of visuals through color, clip art images, and graphic organizers helps students to remember by stimulating more areas of the brain. They are especially effective in accessing the emotional memory pathway, which some researchers believe is the strongest of all of the pathways (Sprenger, 1999). Using graphic organizers helps students connect to new learning (Marzano, 2004). Having students draw a colorful visual as an additional memory "hook" helps students to access more memory pathways when they try to move new learning into permanent memory (Jensen, 1998). Sprenger (1999) goes so far as to call these "power pictures" for their strength in activating the emotional memory pathway which aids in learning.

The teacher researchers used three key elements in the visual intervention. The pre and posttests used the same graphic organizer with engaging icons (Appendices B1, B2, C1, and C2). The purpose of using the same icons on the pre and posttests was to help the brain remember

words for the final assessment. Imprinting the image on the pretests and posttests should help the brain to access the emotional memory pathway for easier recall.

In addition, the visual intervention also included a word organizer (Appendices G1 and G2) for students to use as they were learning and rehearsing each word. Every element of the page used a shape and/or icon to provide a visual hook to help students access a memory pathway. The word organizer contained shape icons for: the word, a personal hint, a student-generated color visual, a meaning, and the word used in a sentence. This organizer required the students to draw their own color illustration representing the actual word or a personal hint or symbol for the word. “Drawing in concentration with vocabulary provides children with the means to think in the language by which they receive much of their information, that being the visual language” (Bazeli & Olle, 1995, p. 4). Pickering (1999) extends the importance of color by recommending color coding of paper by topic or category. Pre and posttests were copied on the same color paper to help stimulate a memory pathway of the brain and support the connection to vocabulary.

Music

Much research has been done to suggest that students who have been exposed to music learn and retain new information. “Research results indicate that immersion in musical experiences actually establishes more neural pathways throughout the brain” (Handy, 1994, p. 1). The limbic brain, often considered the “gate-keeper” of long-term memory, seems to be stimulated by music through its emotional influence: “So there is a greater likelihood that information delivered with music will be encoded into a long term memory” (Handy, 1994, p.7).

One would guess that any type of music would stimulate the limbic brain. There is research that suggests, however, that classical, namely baroque, is the best type of music to play

during instruction (Handy, 1994). Playing baroque music quietly in the background increases students' ability to focus and comprehend, especially during study sessions and while reading textbooks. The music's steady 60-80 beats per minute matches that of the heart at rest and helps to activate the alpha brain wave state; the state characterized by relaxed, alert concentration (Handy, 1994). Mozart seems to be getting the most attention. "The working theory is that Mozart's music is most beneficial due to its complexity: melodies are continually transformed and new melodic and harmonic ideas are introduced" (Handy, 1994, p. 138).

During vocabulary activities for this intervention, classical baroque music by Vivaldi and Mozart played quietly in the background. The purpose of this intervention was to use music to create a strong emotional response in order to stimulate the memory pathways of the brain to encourage a marked improvement of vocabulary acquisition.

Movement

Recently educators involved in brain research have revealed new studies exploring how movement affects memory and learning. Jensen (1998) uses research from Tomprowski and Ellis (1986) to support that movement increases heart rate and circulation, allowing more oxygen to the brain, which increases performance. Innovative technologies, such as Magnetic Resonance Imaging (MRI), are allowing experts to "see" when and where the brain activates. "Amazingly, the part of the brain that processes movement is the same part of the brain that's processing learning" (Jensen, 1998, p. 84). As Eric Jensen states, "Today's brain, mind, and body research establishes significant links between movement and learning. Educators ought to be more purposeful about integrating movement activities into everyday learning" (Jensen, 1998, p. 88).

One program that works at using movement to stimulate the brain is Brain Gym® established by Paul E. Dennison, Ph.D. This program is based upon research by educational

therapists, developmental optometrists, and other developmental specialists. Dr. Dennison and his wife developed a learning process called Educational Kinesiology (Edu-K) that includes specific movements called Brain Gym®. These Brain Gym® movements activate the whole brain which allows for optimal learning. It promotes communication among the many nerve cells and functional centers located throughout the brain and body. Blocks in learning occur when information cannot flow freely among these centers (Dennison & Dennison, 1989).

Dr. Dennison addresses the relationship between the left and right hemispheres of the brain, the relationship between the front and back areas of the brain--or frontal lobe and brain stem--and the connection between the top and bottom structures of the brain-- limbic system and cerebral cortex. There have been documented improvements in learning, vision, memory, expression, attitude, attention, homework, behavior, and academic performance through the use of Brain Gym® (Dennison & Dennison, 1989).

Teacher researchers selected three Brain Gym® movements to use in this action research project: Cross Crawl, Brain Buttons, and Hook-ups. The purpose of these movements is to activate the brain and improve student focus and retention. The Cross Crawl is used to activate both brain hemispheres. It is a movement that requires crossing the body's lateral midline. Brain Buttons is used to stimulate the carotid arteries that supply oxygenated blood to the brain. The brain uses one fifth of the body's oxygen. Also, a movement called Hook-ups is used to connect the electrical circuits in the body.

> The human body is one of the most complex of all electrical systems.
> All visual, auditory or kinesthetic input – in fact, all sensory information –
> is changed into electrical signals and relayed to the brain along nerve fibers.
> The brain then sends out electrical signals along other nerve fibers to tell the

visual, auditory and muscular systems how to respond. (Dennison & Dennison, 1989, p. 23)

Project Objective

A lack of rich vocabulary negatively impacts overall reading comprehension. As a result of using three specifically selected interventions based on brain research during the period of September 5th through December 18th, the students of teacher researchers A, B and C will improve their vocabulary acquisition skills. The three interventions included: 1) a word graphic organizer carefully designed for direct instruction of vocabulary along with icon-enhanced pretests and posttests; 2) selected classical baroque music played during vocabulary lessons/activities; 3) three distinct Brain Gym® movements practiced before vocabulary lessons/activities.

Processing Statements

The following presents a list of tasks accomplished by all three individual researchers at their respective schools to implement the interventions:

- ✓ Make copies of master pre and post vocabulary assessments
- ✓ Make copies of weekly vocabulary pre and posttests
- ✓ Make copies of pre and post strategy surveys
- ✓ Make copies of reflective journals
- ✓ Make copies of teacher field note organizers
- ✓ Make copies, distribute, and collect permission slips
- ✓ Administer and collect all data tools
- ✓ Prepare secure storage for student responses to the strategy surveys and reflective journals

- ✓ Teach and process vocabulary graphic organizer requiring student-generated visual
- ✓ Play music during targeted vocabulary activities and posttests
- ✓ Teach Brain Gym® movements and implement before targeted vocabulary activities
- ✓ Compile and analyze the data from the vocabulary pre and posttests, the pre and post strategy surveys, the reflective journal with attitude scale, and the teacher field notes

Action Plan

Pre-week (August 28 – September 1, 2006)

- ✓ Make copies and organize all papers needed for intervention
- ✓ August 30 – Explain and send home Parent Consent Letter
- ✓ Collect Parent Consent Letters throughout week

Week 1 (September 5 – September 8, 2006)

- ✓ Continue to collect Parent Consent Letters
- ✓ September 6 – Parent Consent Letters due
- ✓ Administer vocabulary pretest
- ✓ Administer pre-survey of vocabulary strategies

Week 2 (September 11 – 15, 2006)

- ✓ Introduce brain research finding on music (Mozart and Vivaldi) and movement (Brain Gym®)
- ✓ Begin weekly field notes

Week 3 (September 18 – 22, 2006)

- ✓ Introduce graphic organizer (visual)
- ✓ Introduce vocabulary words – list 1
- ✓ Continue intervention with music, movement, and visual
- ✓ Continue weekly field notes
- ✓ Each teacher tallies pretest data

Week 4 (September 25 – 29, 2006)

- ✓ Introduce vocabulary words – list 2
- ✓ Continue intervention with music, movement, and visual
- ✓ Continue weekly field notes

Week 5 (October 2 - 6, 2006)

- ✓ Introduce vocabulary words – list 3
- ✓ Continue intervention with music, movement, and visual
- ✓ Continue weekly field notes

Week 6 (October 9 - 13, 2006)
- ✓ Introduce vocabulary words – list 4
- ✓ Continue intervention with music, movement, and visual
- ✓ Continue weekly field notes

Week 7 (October 16 – 20, 2006)
- ✓ Introduce vocabulary words – list 5
- ✓ Continue intervention with music, movement, and visual
- ✓ Continue weekly field notes
- ✓ Make graphs for Chapter 2 to show results of pretest data

Week 8 (October 23 – 27, 2006)
- ✓ Introduce vocabulary words – list 6
- ✓ Continue intervention with music, movement and visual
- ✓ Continue weekly field notes

Week 9 (October 30 – November 3, 2006)
- ✓ Introduce vocabulary words – list 7
- ✓ Continue intervention with music, movement, and visual
- ✓ Continue weekly field notes

Week 10 (November 6 – 10, 2006)
- ✓ Introduce vocabulary words – list 8
- ✓ Continue intervention with music, movement, and visual
- ✓ Continue weekly field notes

Week 11 (November 13 – 17, 2006)
- ✓ Introduce vocabulary words – list 9
- ✓ Continue intervention with music, movement, and visual
- ✓ Continue weekly field notes

Week 12 (November 20 -24, 2006)
- ✓ No School and Thanksgiving break

Week 13 (November 27 – December 1, 2006)
- ✓ Introduce vocabulary words – list 10
- ✓ Continue intervention with music, movement, and visual
- ✓ Continue weekly field notes

Week 14 (December 4 – 8, 2006)
- ✓ Administer post vocabulary test
- ✓ Administer post-survey of vocabulary strategies
- ✓ Administer the reflective journal with attitude scale

Week 15 (December 11 – 15, 2006)
- ✓ Each teacher begins to compile and analyze individual results

Week 16 (December 18 – 22, 2006)
- ✓ Partial week - Winter Break
- ✓ Each teacher continues to compile and analyze individual results

Week 17 (December 25 – 29, 2006)
- ✓ No School - Winter Break

Week 18 (January 1 – 5, 2006)
- ✓ Partial week

Week 19 (January 8-13, 2006)
- ✓ All three teachers begin to compile and analyze data collectively

Week 20 (January 15 – 19, 2006)
- ✓ All three teachers continue to analyze data collectively
- ✓ Start creating graphs to show data results

Week 21 (January 22 – 26, 2006)
- ✓ All three teachers will continue to analyze data collectively
- ✓ Continue creating graphs to show data results

Methods of Assessment

The data to be assessed was collected from pre and post vocabulary strategy surveys, pre and post vocabulary tests, a reflective journal with attitude scale, and teacher field notes. The purpose of the pre and post strategy surveys (Appendices A1 and A2) was to gather data on exactly what vocabulary attack strategies the students already knew and used before and after the intervention. The three teacher researchers administered the pre and post-surveys of strategies during class time to 73 students before the intervention and after the completion of the intervention. At the end of the intervention teacher researchers compiled, compared, and evaluated the results of the data examining how many strategies were practiced by students.

The purpose of the pre and post vocabulary tests (Appendices B1 and B2) was to assess how many of the target words students already knew. This way the teacher researchers could accurately evaluate the real growth in knowledge of the target words that were unknown by

students on the pretest. The three teacher researchers administered the pretests and posttests of all target vocabulary words during class time to 73 students before the interventions and after the completion of the interventions. Teacher researchers used an assessment scale to evaluate the level of understanding of each of the word definitions students wrote in the provided column of the posttest. At the end of the intervention period, teacher researchers compiled, compared, and evaluated the results of the data examining how many new words students recognized and understood.

The purpose of the reflective journal with attitude scale (Appendix E) was to gather further clarification and reflection about student opinions on how the graphic organizers, music, and Brain Gym® exercises benefited their ability to remember and use new vocabulary. The three teacher researchers administered this tool during class time to 73 students at the conclusion of the intervention. In January teacher researchers compiled and evaluated the results of the data examining students' engagement in the three intervention activities.

The purpose of the teacher field notes (Appendix F) was for the teacher researchers to gather weekly observations of growth in vocabulary, growth in use of vocabulary strategies, and indications of improved engagement by students. They also recorded comments on needed short-term adjustments and long-term modifications. Teacher researchers compared observations in January of 2007.

CHAPTER 4

PROJECT RESULTS

Historical Description of the Intervention

The objective of this research project was to improve the vocabulary acquisition of the students from the three target classrooms through the use of direct instruction of vocabulary. The method of direct instruction relied on a multisensory approach that included visual graphic organizers, music, and movement. Several tools were used to gather data on the effect of the three interventions: pre and post strategy surveys, pre and post vocabulary tests, a reflection journal with attitude scale, and teacher field notes.

Three interventions based on brain research were put in place before and during vocabulary activities. These included the use of: visual graphic organizers, classical music, and Brain Gym® movements. The first was a visual intervention that involved the use of shape icons on specially designed pre and post vocabulary tests, as well as the unique word graphic organizer. The purpose of this element of the intervention was to help the brain create images and thus to be able to remember and recall each word and its meaning. The second was the use of classical music during vocabulary activities. The purpose of this intervention was to improve student focus, retention, recall, and their sense of calmness. The third and final intervention utilized three Brain Gym® movements before vocabulary activities. The purpose of this intervention was to activate the electrical pathways in the brain to enhance focus and memory.

The pre and post strategy surveys (Appendices A1 and A2) gave both students and teachers a better awareness of what word strategies students were using before and after the intervention. This tool also served to track any changes or growth in the use of these commonly used word strategies by the end of the intervention period. While direct instruction of the

strategies was not a primary factor in the intervention, practice of certain strategies was embedded in the design and application of the visual graphic organizer.

The master 50-word pre and post vocabulary tests (Appendices B1 and B2) tracked real growth, or lack thereof, in the knowledge of challenging vocabulary words. The weekly five-word pre and posttests (Appendices C1 and C2) served to break up the longer 50-word list and make it more manageable for student learning and for easier accessing of long-term memory. In the two seventh grade classrooms, words with SSAT roots and affixes were chosen; in the second grade classroom, district-wide required words were used (Appendix D). The fun icons were added to try and access the emotional memory pathway while the matching structure of all of the pre and posttests served as a way to embed images to help students remember the words.

The word graphic organizers presented the required elements in shape icons to further aid in the retention of the word meanings and to provide rehearsal, recall, and a deeper understanding of the word. Two versions of the word graphic organizer were used. The seventh grade version (Appendix G1) was designed by the teacher researchers and contained the following shapes and categories: arrow for the word, cloud for the word meaning, star for a student hint/clue, rectangle to use the word in a sentence, and easel for an illustration of the word. The second grade version (Appendix G2) was selected by the teacher researcher to be age appropriate for the younger students. The use of color, which also helps the brain remember and recall, was another key component of the visual intervention. Both versions of the graphic organizer required a student-generated color illustration. Using consistent color paper for selected vocabulary handouts was a final component of the total visual intervention. The purpose of combining all of these elements in the visual part of the intervention was to aid students in memory retention and recall.

At the end of the intervention period, students filled out a reflective journal with attitude scale (Appendix E) to gather their feedback. Students responded numerically with their evaluations regarding the success or failure of the interventions in improving their vocabulary

acquisition. The journal tool also gathered narrative input from students on whether or not they felt the interventions were personally engaging and helpful to their learning.

A teacher field note organizer, the final tool, gathered observational data during the intervention (Appendix F). The teacher researchers used the organizer throughout the length of the intervention to track observations in the categories of: visual graphic organizers, music, Brain Gym® movements, and vocabulary changes. The purpose was to track and make needed adjustments to lessons and activities as problems arose, as well as to gather recommendations for future implementation and record interesting student and teacher observations.

During the time frame of the intervention, certain changes were put into place. The pace of the weekly tests was slowed down to address the learning needs of the second grade students. Periodically, all teacher researchers inserted extra weeks into the original action plan to add review games and activities for rehearsal time to improve memory retention. This decision was made due to the large number of words and the length of time to complete the overall intervention.

Presentation and Analysis of the Results

The most significant data source to assess real growth in the vocabulary acquisition of students is the comparison of the results between the pretest and posttest on the master 50-word vocabulary lists (Figure 4 and Figure 5). The results in Figure 4 indicate substantial growth in student recognition of the teacher-selected vocabulary words. Before the intervention was implemented, 43% of students responded that they had “never heard or seen” the selected words. After the intervention, only 7% chose this response. The category that shows the most significant change, however, is the student responses to "I know this word.” On the pretest, 27% of students chose this response; while on the posttest, 68% of students chose this response—an increase of 154%, considerable growth in vocabulary recognition. In addition, another 15% felt they could “guess the meaning.”

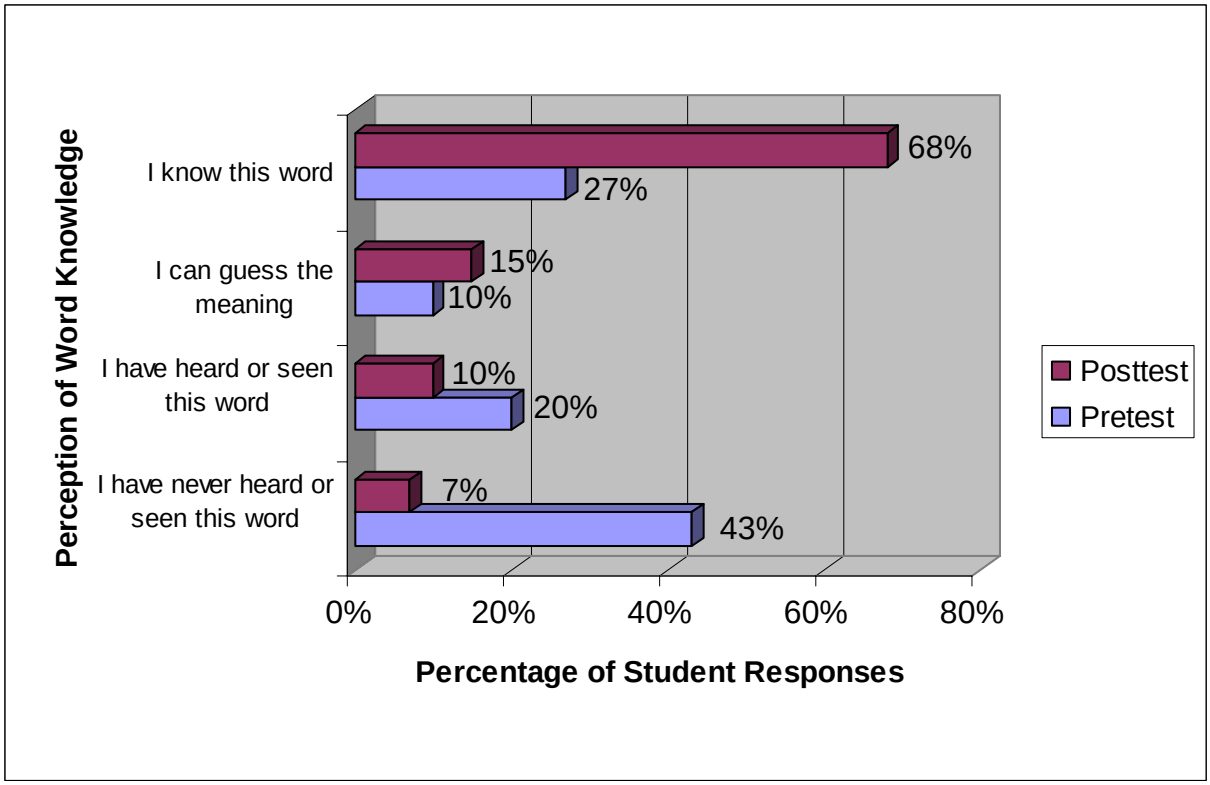


Figure 4. Results of student perceptions of word knowledge

While Figure 4 gathers students' own perceptions of their word knowledge, Figure 5 demonstrates the teacher researchers' assessment of students' level of understanding of the words. Teacher evaluations of the vocabulary pretests revealed that only 10% of students demonstrated a "clear" understanding of the words. On the posttest teacher researcher evaluations indicate that 53% of students now demonstrated a "clear" understanding of the words. The results show that students clearly understood and could define over five times as many words after the intervention, from 378 words to 1,941 words. Furthermore, pretest results indicate that an additional 11% of students showed "some" understanding of the words, while on the posttest that number had risen to 17%.

When the data from Figure 4 and Figure 5 were compared, however, teacher researchers discovered a sizeable gap between the students' perception of their vocabulary knowledge and the actual level of vocabulary understanding. On the pretest, 27% of the students responded that they "know" the words; but after evaluating their responses, teacher researchers discovered that only 10% of the words were actually well known and defined correctly. In addition, Figure 5 shows that on the pretest 79% of the students either did not attempt a definition of the word or gave a totally incorrect definition of the word, while the results on the posttest show only 30% demonstrated "no understanding." Even though student perception of their own word knowledge was not completely accurate when analyzed by teachers, the results in both Figure 4 and Figure 5 still show evidence of considerable growth in vocabulary acquisition.

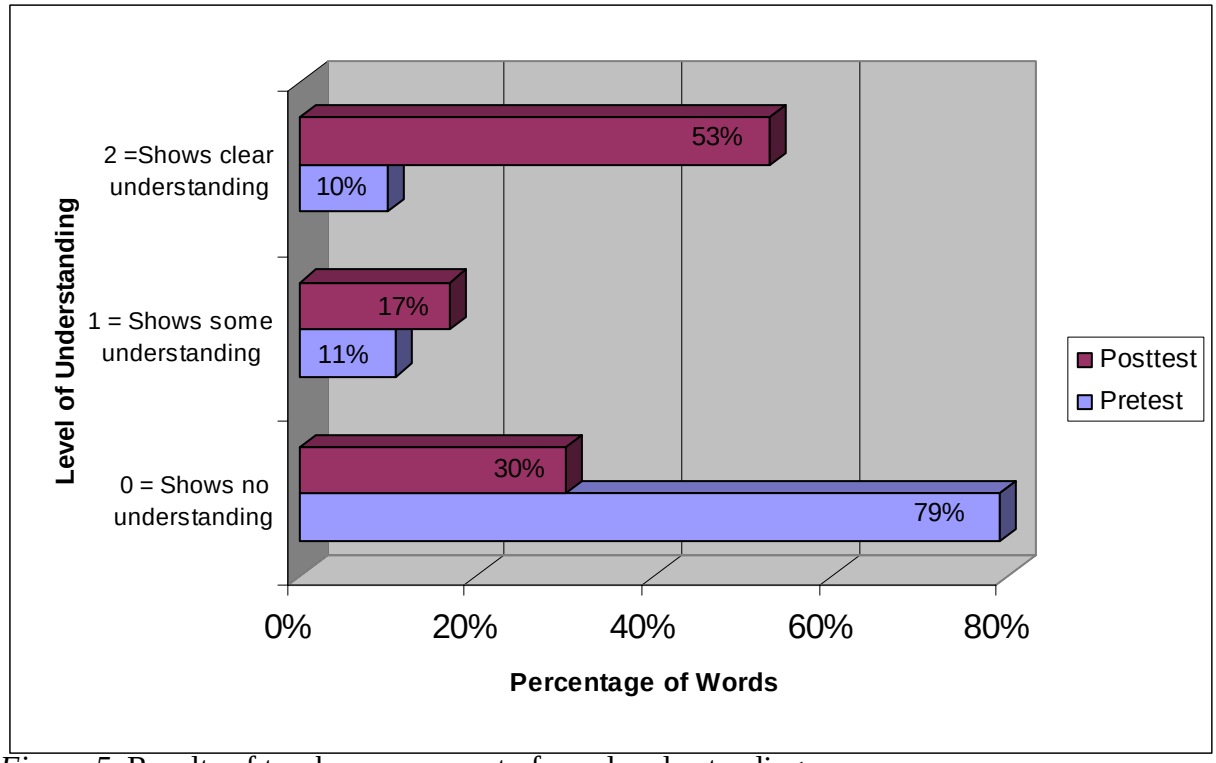


Figure 5. Results of teacher assessment of word understanding

The next data tool was a strategy survey (Appendices A1 and A2) that gathered data on the use of selected reading strategies before and after the intervention. The teacher researchers

varied their use of direct instruction of these strategies to be age appropriate for their individual classrooms. Some strategies were informally embedded in the lessons surrounding the visual graphic organizer, as well as in vocabulary games which were added during the intervention period.

The data shown in Figures 6 and 7 indicate mixed results in student use of these seven common vocabulary strategies. The most significant change is seen in the use of Strategy 4. On the pretest, 74% of students responded that they use Strategy 4 "sometimes" or "often"; however, on the posttest 84% responded that they use it "sometimes" or "often." The results on the use of Strategy 3 show similar growth as student responses to "sometimes" or "often" rose from 71% to 79%. There is also an increase from 72% to 79% of students who responded that they now use Strategy 2 "sometimes" or "often." A definite decline in student use of Strategy 6 is also shown. The use of this strategy dropped from 86% of students who responded that they "sometimes" or "often" use this strategy on the pretest, to 64% who "sometimes" or "often" use it on the posttest.

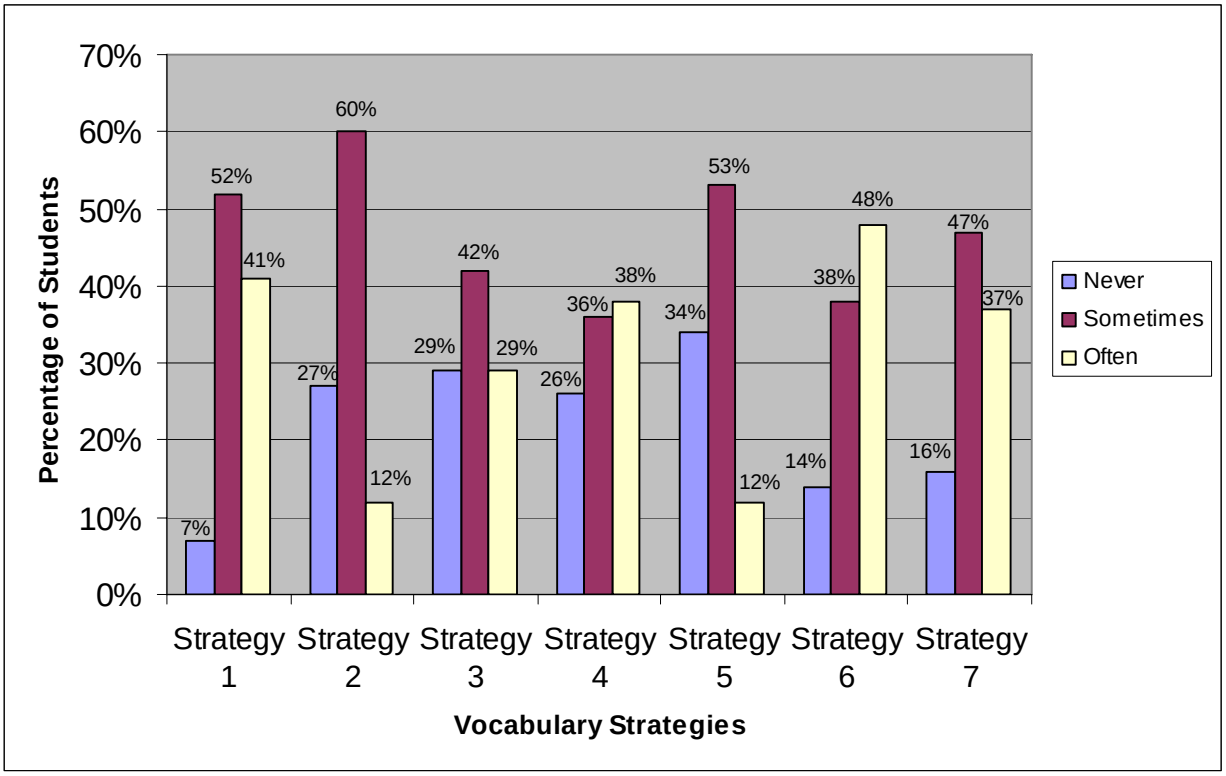


Figure 6. Results of pre-survey of common word strategies used by students

Strategy 1 I sound out the word.
Strategy 2 I chunk the word into parts, looking for smaller words I know.
Strategy 3 I use the picture to help me understand the word.
Strategy 4 I create a picture in my mind.
Strategy 5 I make a connection to another word or idea I do know.
Strategy 6 I read around the word to look for clues.
Strategy 7 I think back to what happened before and decide what makes sense.

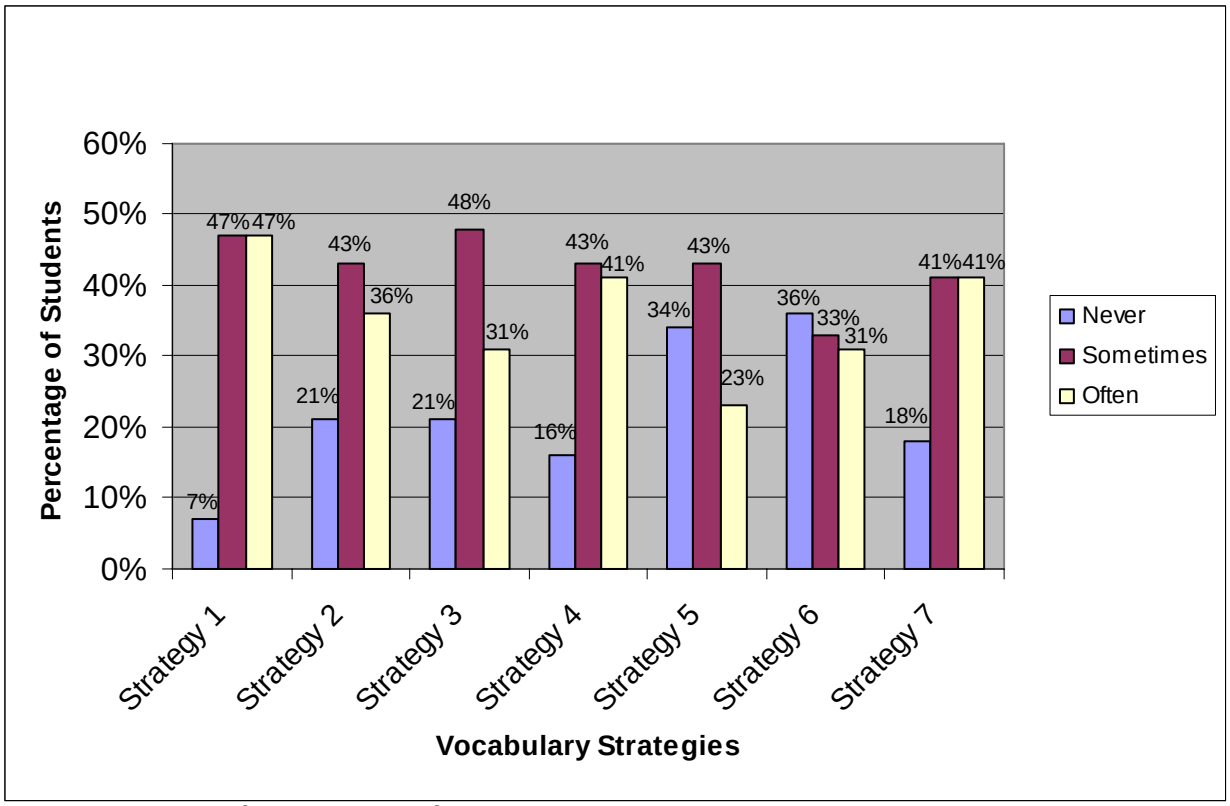


Figure 7. Results of post-survey of common word strategies used by students

A reflective journal with attitude scale, the third assessment tool, gathered information on students' reactions to the use of the three multisensory elements of the intervention: visual, music, and movement (Appendix E). This tool gathered data numerically and through reflective responses. Figure 8 demonstrates that 88% of students responded that the use of the word graphic organizer “helped them some” or “a lot” to learn and remember the vocabulary words. Figure 9 shows that 77% of students responded that the classical music played before and during vocabulary activities and tests “helped them some” or “a lot” to learn and remember the vocabulary words. Finally, Figure 10 shows that 78% of the students responded that the use of

the movement “helped them some” or “a lot” in learning and remembering the words. The combined data of Figures 8, 9, and 10 indicate that 77% to 88% of the students, a strong majority, believed that the three multisensory teaching methods positively impacted their engagement and learning.

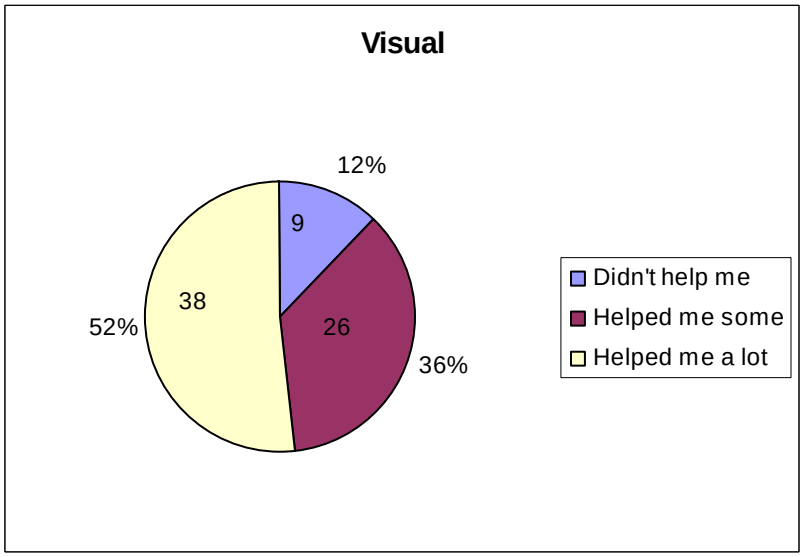


Figure 8. Student responses to use of visual organizer: inside of graph shows actual number of students; outside of graph shows percentage of students

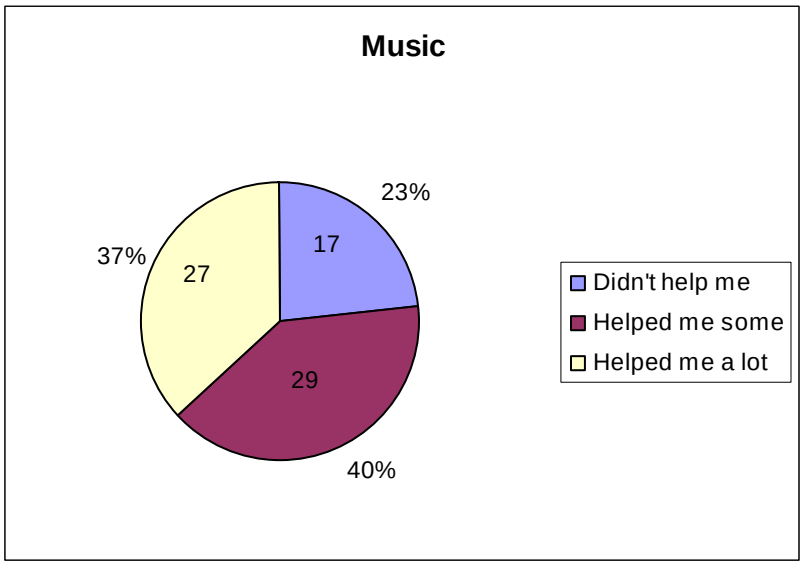


Figure 9. Results of student responses to use of music: inside of graph shows actual number of students; outside of graph shows percentage of students

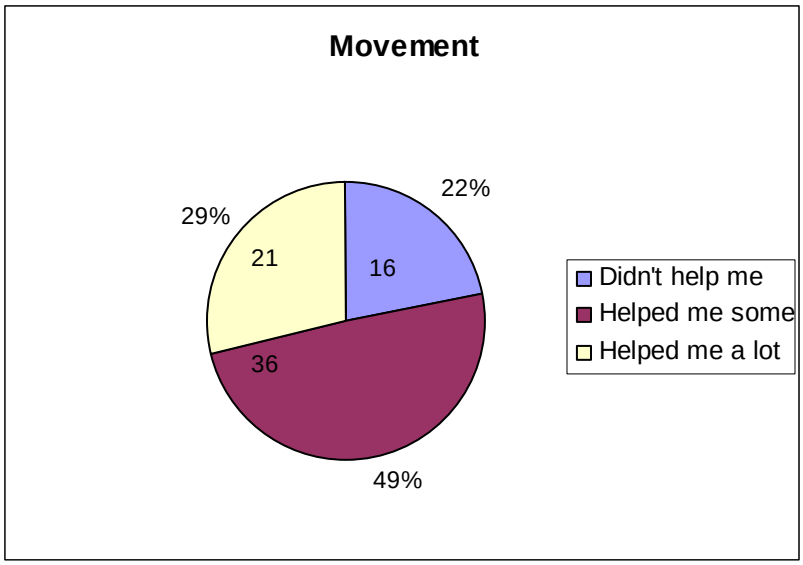


Figure 10. Student responses to use of movement: inside of graph shows actual number of students; outside of graph shows percentage of students

Teacher field notes, the fourth and final tool, gathered the observations of the teacher researchers on the weekly process of the lessons and activities, as well as the students' engagement and learning issues (Appendix F). The field notes recorded both the strengths and weaknesses of daily lessons in the classroom so that short-term adjustments could be made. They were also a resource to gather recommendations to make long-term changes later. As problems were discovered, teacher researchers made individual adjustments that were age appropriate for the students in the target classrooms. All three teacher researchers observed that the graphic organizer took an extremely long time to fill out for each and every word. Due to district curriculum requirements, time to fit in the intervention as originally planned became difficult. The 50-word master pretest and posttest took a very long time to complete for many students, especially those students with IEPs and the younger second grade students. The directions on the pre and posttests were confusing to students and needed to be clarified verbally by the teacher researchers.

Conclusions and Recommendations

The post data from all three target schools show that the Solution Strategy implemented definitely improved the vocabulary acquisition of the target students. According to the teacher

researchers' evaluations of posttest definitions, students clearly understood and could define five times as many new words after the intervention was completed. However, because the overall intervention included so many separate pieces, it is difficult to determine exactly whether one piece was significantly more effective than another, or whether it was truly the combination of all three (i.e. the multisensory approach) that provided the strongest impact. Certainly the research literature indicates, and the project results support, that direct instruction of vocabulary does improve vocabulary acquisition. The project results concerning the individual effect of the visual graphic organizers, the classical music, and the Brain Gym® movements are not as clear cut.

The teacher researchers strengthened their commitment to using multisensory teaching methods as more and more of the results pointed to its powerful impact on improving student learning. The benefits of offering students a variety of teaching methods became increasingly clear. Certain methods engage and aid some students more, while entirely different methods prove to be more powerful for other students. By using multisensory approaches within their classrooms, the teacher researchers believe they effectively engage the diverse needs and personalities of far more students.

The teacher researchers determined that the visual word graphic organizer created the most profound outcome. The immediate effect on student engagement and learning was noted early on in the field notes of all three of the teacher researchers. On the posttest an increase in the student use of Strategies 3 and 4, which had to do with visualizing and using pictures, appears to connect to the strength of the visual intervention. The observations of the teacher researchers aligned closely with the student responses from the reflective journal with attitude scale. The word organizer took a lot of work and time for the students to complete, but they continued to stay engaged with this tool throughout the intervention. As one student stated, "The colors really helped me. When I was stumped on a word, I would think back to what color I used in my organizer, and then I knew what it was."

While the teacher researchers strongly recommend continuing the direct instruction of challenging vocabulary, modifications to the original Solution Strategy are needed. All three teacher researchers agreed that more time was needed to implement the plan well. Either the words per week need to be reduced or the lesson plan time needs to be spread out over two weeks, instead of the original one week plan. This time problem proved especially true for the second grade students. In addition, the 50-word test was too long and exhausting for both the younger and older students. The teacher researchers felt this affected the accuracy of the results of the second grade students and believe that a multiple choice test with definitions provided or a matching test would resolve this problem. Another possible way to address these difficulties is to start out with fewer words per week during the first few weeks of the intervention and then increase the words per week once the structure of the activities is well established. All three teacher researchers believe that weekly or biweekly cumulative vocabulary tests would be more effective than the long 50-word posttest. In addition, the visual graphic organizers were especially time consuming for students to fill out accurately and well.

Teacher researchers also felt that review sessions and more discussion time were needed every ten to twenty words to allow rehearsal of words to ensure retention. Review sessions were added during the intervention period and included: comic strip books, vocabulary cartoons, vocabulary password, vocabulary charades, word wall hunt, slideshow games, manipulative letter games, etc. Teacher researchers and students felt that more “talk time” and peer sharing should also be thoughtfully planned into the intervention.

Finally, minor adjustments to the individual multisensory elements (visual, music and movement) are recommended. The word graphic organizer needs to be modified to match the needs of each grade level and the directions need to be clarified on the vocabulary pre and posttests. While students enjoyed the classical music, teacher researchers felt that additional types of music would lend variety and would be just as effective. Teacher researchers also felt that energizers, as well as other Brain Gym® movements, would be worth exploring.

The teacher researchers of this action research project consider the use of multisensory methods of direct instruction a powerful tool in the quest to improve student vocabulary acquisition. As with any new practice, this Solution Strategy benefited from needed short-term modifications and will improve further with additional long-term alterations. The development of curriculums that promote vocabulary acquisition is important work in the goal of improving overall reading comprehension. In addition, all three teacher researchers are firmly committed to implementing multisensory methods for all academic content as standard practice in their classrooms.

References

Allen, J. (1999). *Words, words, words*. Maine: Stenhouse Publishers.

Baker, S. K., Simmons, D. C., & Kameenui, E. J. (1999). *Vocabulary acquisition: Synthesis of the research*. (Tech. Rep. No. 13). University of Oregon, National Center to Improve the Tools of Educators. (ERIC Document Reproduction Service No. ED 386860)

Baker, S. K., Simmons, & D. C., & Kameenui, E. J. (1995). *Vocabulary acquisition: Curricular and instructional implications for diverse learning*. (Tech. Rep. No. 14). University of Oregon, National Center to Improve the Tools of Educators. (ERIC Document Reproduction Service No. ED386861)
,

Bazeli, M. & Olle, R. (1995). *Using visuals to develop reading in vocabulary*. (Report No. IR 017 672). Chicago, IL: International Visual Literacy Association. (ERIC Document Reproduction Service No. ED 391519)

Beck, I. L., McKeown, M. G., & Kucan, L. (2002). *Bringing words to life: Robust vocabulary instruction.* New York: The Guilford Press.

Biemiller, A. (2000, Fall). Teaching vocabulary early, direct, and sequential. *Perspectives.* Vol. 26 *(4).* Reprinted in *American Educator,* Spring 2001.

Burchers, S. (1998). *Vocabulary cartoons.* Punta Gorda, FL: New Monic Books.

Burke, K. (2005). *How to assess authentic learning*. Glenview, IL: LessonLab.

Chall, J.S. (1983). *Stages of reading development*. New York: McGraw-Hill.

Collins, R. (1999). Raising readers: The tremendous potential of families [Electronic version]. *Start Early, Finish Strong: How to Help Every Child Become a Reader,* Chapter 1.

Condis, P., Parks, D., & Soldwell, R. (2000, May). *Enhancing vocabulary and language using multiple intelligences.* Chicago, IL: St. Xavier University. (ERIC Document Reproduction Service No. ED 441 269)

Culbert, E, Flood, M. Windler, R & Work, D, (1998, May). *A qualitative investigation of the use of graphic organizers.* Paper presented at the SUNY-Geneseo Annual Reading and Literacy Research Symposium, Geneseo, NY. (ERIC Document Reproduction Service No. ED 418381)

Dennison, P.E. & Dennison, G.E. (1989). *Brain Gym®: Teacher's edition revised.* Ventura, CA: Edu-Kinesthetics, Inc.

Elementary Reading Project at Developmental Studies Center. (2003). *Making meaning: Strategies that build comprehension and community* (Vols.1-2). Oakland, CA: Developmental Studies Center.

Fishback, S. (1998-1999, Winter). Learning and the brain. *Adult Learning, 10(2),* 18-23.

Handy, Shirley. (1994) *Teaching with the brain in mind: The importance of music, movement, rhythm and rhyme.* Hilmar, CA: National Educational Network.

Hanson, J.R. (1996). *Metacognition: Strategies for "forthought"* (Report No. PS 025-085). Baltimore, MD: Annual Conference and Exhibit of the National Middle School Association. (ERIC Document Reproduction Service No. ED405960)

Helfgott, D. & Westhaver, M. (2006). Inspiration® (Version 8.0) [Computer software]. Beaverton, OR: Inspiration Software®, Inc.

Honig, B. & Diamond, L. (2004, Winter). The role of vocabulary in building comprehension. *The Core Reading Expert, 1-4.*

Jensen, E. (1998). *Teaching with the brain in mind*. Alexandria, VA: Association for Supervision and Curriculum Development.

Jensen, E. (2000, November). Moving with the brain in mind. *Educational Leadership, 58*(3*),* 34-37.

Koskinen, P. S., Wilson, R. M., Gambrell, L. B., & Neuman, S. B. (1993). *Captioned video and vocabulary learning: An innovative practice in literacy instruction (*Instructional Resource No. 3*).* Athens, GA and College Park, MD: National Reading Research Center. (ERIC Document Reproduction Service No. ED 361652)

Marzano, R. (2004). *Building background knowledge for academic achievement: Research on what works in schools.* Alexandria, VA: Association for Supervision and Curriculum Development.

Mountain, L. (2002, September). Flip-a-chip to build vocabulary. *Journal of Adolescent & Adult Literacy, 46(1*), 62-68.

Pickering, J.C. (1999). *MI & technology: A winning combination!* The Rhode Island Foundation: The University of Rhode Island, Teachers in Technology Initiative, MI Smart! Program.

Rapaport, W.J. *In defense of contextual vocabulary acquisition: How to do things with words in context.* Retrieved May 23, 2006 from http:// www.cse.buffalo.edu/~rapaport/Papers/context.auconf.pdf

Rapaport, W.J. *What is the "context" for contextual vocabulary acquisition?* Retrieved May 23, 2006 from http:// www.cse.buffalo.edu/~rapaport/Papers/context.auconf.pdf

Reading A-Z. (n.d.). Retrieved April 10, 2006 from http://www.readinga-z.com/

Richek, M.A. (2005, February). Words are wonderful: Interactive, time-efficient strategies to teach meaning. *Reading Teacher*, *58*, 414-423.

Robb, L. (2000). *Teaching reading in middle school*. New York: Scholastic Professional Books.

Smith, C.B. (1997). Vocabulary instruction and reading comprehension. *ERIC Digest*. (ERIC Document Reproduction Service No. ED412506)

Sprenger, M. (1999). *Learning and memory: The brain in action*. Alexandria, VA: Association for Supervision and Curriculum Development.

Thompson, M.C. (1996). [Teacher's manual]. *The word within the word*. *(Vol. 2)* Unionville, NY: Royal Fireworks Press.

Wolfe, P. (2001). *Brain matters: Translating research into classroom practice*. Alexandria, VA: Association for Supervision and Curriculum Development.

Appendices

(A-G)

Appendix A1

Vocabulary Strategy Pre-Survey

Name:

1 Never	2 Sometimes	3 Often
		

1. I sound out the word.

1	2	3

2. I chunk the word into parts, looking for smaller words I do know (prefixes, suffixes, roots).

1	2	3

3. I use the pictures to help me understand the word.

1	2	3

4. I create a picture (visual) in my mind.

1	2	3

5. I make a connection to another word or idea I do know.

1	2	3

6. I read around (read back and/or read aloud) the word to look for clues.

1	2	3

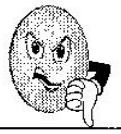
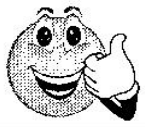
7. I think back to what happened before and decide what makes sense.

1	2	3

Appendix A2

Vocabulary Strategy Post-Survey

Name:

1 Never 	2 Sometimes 	3 Often 

1. I sound out the word.

1	2	3

2. I chunk the word into parts, looking for smaller words I do know (prefixes, suffixes, roots).

1	2	3

3. I use the pictures to help me understand the word.

1	2	3

4. I create a picture (visual) in my mind.

1	2	3

5. I make a connection to another word or idea I do know.

1	2	3

6. I read around (read back and/or read aloud) the word to look for clues.

1	2	3

7. I think back to what happened before and decide what makes sense.

1	2	3

Appendix B1

Vocabulary Pretest

Name_____
Master Weekly Word List # _____

Word	I **have never** heard/seen this word 	I **have** heard/seen this word 	I can **guess** what this word means 	I **know** the meaning of this word & can use it in a sentence 	**Predict** the meaning of the word
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

Appendix B2

Vocabulary Posttest

Name_____
Master Weekly Word List #_____

Word	I **have never** heard/seen this word 	I **have** heard/seen this word 	I can **guess** what this word means 	I **know** the meaning of this word & can use it in a sentence 	**Write** the meaning of the word
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

Appendix C1

Vocabulary Weekly Pretest

Name_____
Weekly Word List#_____

Word	I **have never** heard/seen this word 	I **have** heard/seen this word 	I can **guess** what this word means 	I **know** the meaning of this word & can use it in a sentence 	**Predict** the meaning of the word
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

Appendix C2

Vocabulary Weekly Posttest

Name_____
Weekly Word List # _____

Word	I **have never** heard/seen this word 	I **have** heard/seen this word 	I can **guess** what this word means 	I **know** the meaning of this word & can use it in a sentence 	**Write** the meaning of the word
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

Appendix D

Word Lists

School Site A Vocabulary List

biology	deduction	oligarchy	asterisk	subway
biography	conduct	monarchy	asteroid	subsidiary
geology	microscope	anarchy	astrology	subvert
geography	microorganism	intervene	benefactor	thermometer
photograph	macroeconomics	intermediate	beneficial	centimeter
cyclone	credibility	automatic	incorporate	binoculars
cylinder	incredulous	autocrat	transcontinental	bipartisan
encyclopedia	monogamy	autobiography	transport	synonym
dictate	monotone	dormitory	translucent	antonym
diction	credentials	dormant	corpulent	pseudonym

School Site B Vocabulary List

biology	incredulous	deduct	intervene	substructure
biography	credit	conduct	interview	transport
autobiography	monotone	microscope	automatic	translucent
geology	mononucleosis	microorganism	autoimmune	transcontinental
geography	dormitory	macroeconomics	autocrat	astronomy
cyclone	dormant	archrival	autonomous	astrology
tricycle	destruct	monarch	contemporary	perimeter
dictionary	construct	conductor	temporal	peripheral
diction	restructure	anarchy	submarine	benevolent
credibility	predict	intramural	subordinate	beneficial

School Site C Vocabulary List

syllable	pre-writing	transition	model	prey
noun	contraction	comma	place value	map key
discussion	dictionary	apostrophe	temperature	continent
comprehension	adjective	digit	Fahrenheit	geography
compound word	sequence	decimal point	cardinal directions	compass rose
main idea	genre	graph	data	land form
compare	schema	addends	exercise	ancestors
contrast	root word	equivalent	life cycle	tradition
quotation mark	infer	quantity	habitat	timeline
draft	abbreviation	diagram	predator	Celsius

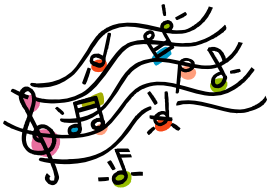
Appendix E

Reflection Journal

Name: _____

Please reflect on each vocabulary intervention listed. Circle the statements below that fit your feelings best. Then thoroughly answer each journal stem and explain how the activities helped you remember new vocabulary words.

MUSIC



1) Didn't help me at all
2) Helped me some
3) Helped me a lot

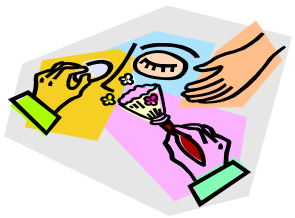
Explain how you feel about using music when learning vocabulary . . .

MOVEMENT

1) Didn't help me at all
2) Helped me some
3) Helped me a lot

Explain how you feel about using movement when learning vocabulary . . .

VISUAL



1) Didn't help me at all
2) Helped me some
3) Helped me a lot

Explain how you feel about using visual graphic organizers when learning vocabulary . . .

Any other comments you would like to share…?

Appendix F

Teacher Field Notes
(Improving Vocabulary Acquisition)

Word Graphic Organizer with Student Visual

P

M

I

Music

P

M

I

Brain Gym®

P

M

I

Vocabulary Changes or Comments . . .

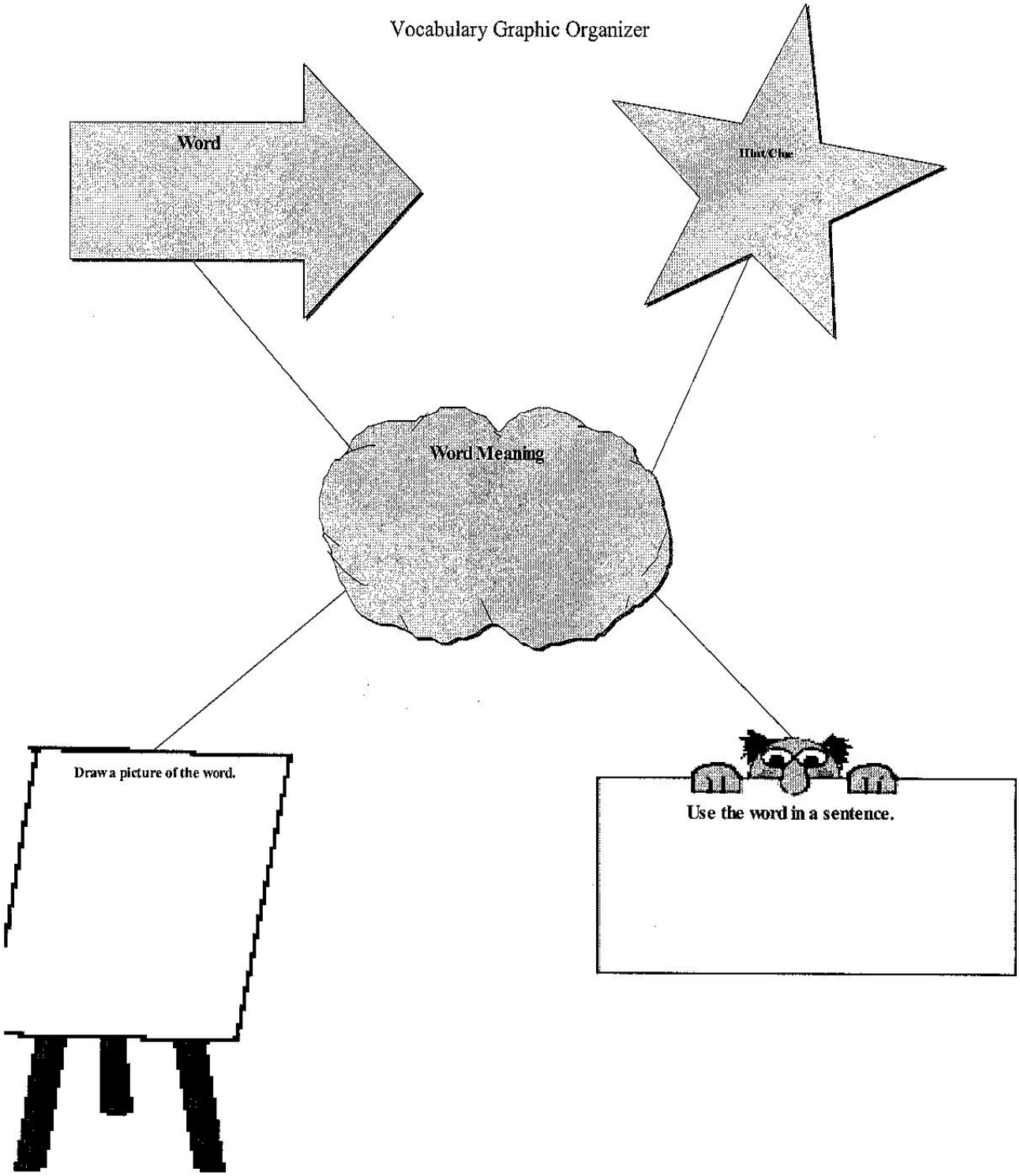
P

M

I

Appendix G1

Vocabulary Graphic Organizer



Appendix G2

Name: _____

Word

_____

Definition _____

_____

_____

Synonym

Antonym

Draw a picture of the word.

Use the word in a sentence.

_____

_____

_____

INSTRUCTIONS: Have students write a vocabulary word in the oval. Then have them fill in the boxes with additional information about the word.