Guided Language Acquisition Design:

Making A Difference In Student Achievement

A Special Project

Presented to

Dr. Audrian Huff

Heritage University

In Partial Fulfillment

of the Requirements for the Degree of

Masters of Education

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Spring 2007

FACULTY APPROVAL

Guided Language Acquisition Design:

Making A Difference In Student Achievement

Approved for the Faculty

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ABSTRACT

There has been much research to determine best teaching practices for students acquiring English as second language, and students of poverty. Guided Language Acquisition Design is a language development program, full of multiple teaching strategies, designed to engage such students. This study takes a closer look at student achievement as measured by a pretest and posttest in a second grade classroom. Students were first administered a pretest. Then an Earth Science Fossil Unit was taught. The unit aligned to 9 of the Washington State Grade Level Expectations for second grade, and included multiple teaching strategies from Guided Language Acquisition Design. The students were then administered a posttest. The results show that the program does make a difference in student achievement.

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CHAPTER 1

Introduction

Background for the Project

Education has gone through constant changes over the years. Standards for teachers and students have been established by the Office of the Superintendent of Public Instruction. As more accountability has been placed on the shoulders of districts and schools, "The art of teaching is rapidly becoming the science of teaching" (Marzano, 2001, p. 1). Students and teachers have been held to a new and higher standard regardless of socioeconomic status and language proficiency. In 2001 President Bush signed the No Child Left Behind act, which has changed education dramatically. The Legislation ensured the following for districts, which had Limited English Proficient Students:

> "The No Child Left Behind Act will facilitate the comprehensive planning by States and school districts needed to ensure implementation of programs that benefit all limited English proficient students by helping them learn English and meet the same high academic standards as other students" (Ed.gov, 2007, p. 3)

This piece of legislation left many states to make much needed changes in the way teachers taught all, but more specifically, second language students and prepared students for the mandated assessments. An teachers and administrator would question whether or not students were prepared for the Washington Assessment of Student Learning or prepared to be proficient literate English speakers within the time frame of 13 years of public education.

This is Statement of the Problem

Schools in the area of this study, areas of high poverty and second language populations, have struggled to meet Annual Yearly Progress as measured by the Washington Assessment of Student Learning. "The passage of No Child Left Behind (NCLB 2002) has carried sweeping educational reforms, and a focus on standardized testing that is now being felt on a daily basis in schools and classrooms across the United States." (Menken, 2007 p. 1) In accordance with No Child Left Behind, schools have entered into School Improvement if ten percent growth on the Washington Assessments of Student Learning has not been met for three years in a row. The high stakes have caused teachers and administrators to search out best teaching and learning practices to ensure student success (2007).

Limited English Proficient students and students of poverty have taken the Washington Assessment of Student Learning despite the ability to read and write proficiently in English and students have not done well according to the Washington State Report Card (2006). Students have struggled to learn material and master assessments administered in English. Limited support has been allowed for Limited English Proficient students while taking the Washington Assessment of Student Learning. Poverty has been another huge factor in student achievement. " Students who live in poverty are not only more likely to underachieve than their peers from middle- and high- income households, they are also at risk of not completing school" (Taylor, 2005, p. 1). Students who endured combined poverty and limited English status have struggled more than students who have only limited English alone. More professional development is needed to help increase student success.

Purpose of the Project

The study determined if Guided Language Acquisition Design instruction was improving second grade student comprehension of content vocabulary and information as required by Grade level Expectations, which in turn would increase achievement on the Washington Assessment of Student Learning. The purpose of the research was to determine if students would improve scores from a pretest, to a posttest after an earth science unit was taught using Guided Language Acquisition Design.

Delimitations

The study was conducted in a large district in Eastern Washington. The district had a 68.6 % Hispanic population and 66.7 % free or reduced lunch population. The percent of students considered transitional bilingual was 36.1 %. Students who were migrant consisted of 17.7 % of the district population. The students in the study were from one of the district's highest Hispanic populated as well as highest free and reduced meal populated elementary schools (2006).

The school district was committed to the late exit bilingual model (Appendix pg 67-68). Students tested by the Language Assessment Scale and Language Assessment Scale Oral were placed in either the English only or bilingual track according to student scores and the language spoken in the students' homes'. Students placed in the bilingual track were attending school in bilingual classrooms up until 4th or 5th grade when students were then transitioned into an English classroom. The grade in which the students were transitioned into English depended on the bilingual staff in the school the students were attending. The school district would have liked to exit students in bilingual programs in the 6th grade, but because there were too few bilingual teachers available, most students were placed in an English classroom in 5th grade.

Guided Language Acquisition Design had been practiced in the school district since 1998. Individual teachers' years of Guided Language Acquisition Design experience varied, as the district was moving toward 100 % of all teachers trained in Guided Language Acquisition Design. Training consisted of 36 hours of lecture and observation of teaching strategies with students. The trainings were offered 2 to 3 times a year. Training teachers was a time consuming task.

The Elementary school where the study took place consisted of 517 students. The Hispanic population was 91.7 % with 61.8 percent being enrolled in a transitional bilingual program. 88.3 percent of students qualified for free or reduced-priced meals (2006).

Students studied were in second grade. The classroom consisted of 20 students at the time of the study, but had gained 9 and lost 8 students since the beginning of the school year. Eleven of the students in the classroom had been enrolled in the same elementary school since Kindergarten, and 2 students had been enrolled in another school in the same district prior to coming to the current school. Six students were new to the district as second graders. One student was a transfer from another 2nd grade classroom in the same school.

This classroom had a high content of special needs students. Four students received services for speech. Two students were currently receiving services from the special education teacher at the time of the research. One student was receiving occupational therapy services and had an Individualized Education Plan, but did not receive services from the special education teacher. An Individualized Education Plan was written for students who qualified for Special Education. Disabilities, modifications, and accommodations were written specific to each student. Academic goals were set and evaluated regularly for each student.

Eleven students were Limited English Proficient status. Limited English Proficient students had been identified by the Language Assessment Scale Oral test given when the students first entered the school district. The test measures receptive and expressive language. Various aspects of language were tested separately in individual subtests. Scores were weighted and combined into one total proficiency level for each language component. Students were scored in a 1 to 5 scale. The score of 1 was considered a Non-English speaker. Students' who had a score of 2 or 3 were considered Limited English Proficient and a score of 4 or 5 was considered to be a fluent English speaker. One of the students qualified, with a score of 1 on the Language Assessment Scale Oral, but was pulled from the transitional bilingual program in Kindergarten per parent request. Another student qualified for the transitional bilingual program but never entered per a decision made by a Child Study Team with parent consent due to the student's disability. Accommodations for all Limited English Proficiency students consisted of reading test items for Washington Assessment of Student learning test, some bilingual para-educator support, and Guided Language Acquisition Design instruction.

One student was mildly autistic with a deficiency in social skills and minimal uncontrolled outbursts. The student struggled with change. This student received services in special education for social skills, speech, reading, writing, and mathematics. The student was pulled out of the general classroom 1 hour a week for social skills, 30 minutes per week for reading and 30 minutes per week for mathematics. Writing instruction was solely from the general education teacher with a para-educator in the general classroom 180 minutes per week. The para-educator worked with another student during this time as well. The student with autism was considered to be on second grade level in reading, writing, and mathematics by the general education teacher. Accommodations for the student were careful monitoring of the students'

interaction with others, special attention to directly teaching appropriate social interaction, general education teacher collaboration with the social thinking skills teacher and the resource room teacher to coordinate consistent use of language.

One student was legally blind, but had some vision and could maneuver around the classroom unassisted. The student received special services for learning Braille reading 225 minutes per week. The student also qualified and received services in special education in reading for 90 minutes per week and in mathematics 90 minutes per week. The general education teacher instructed the student in writing with a para-educator in the general classroom 180 minutes per week. The para-educator worked with another student during this time as well. Accommodations in the general education classroom for the student consisted of all reading and mathematics material being blown up to at least forty-eight sized font and a magnifying glass was available for the student to use in addition to reading glasses. The student's desk was located at the front of the room in order to be able to see the overhead screen, but consideration of the student not being able to see everything was addressed with a large print size copy being placed in front of the student at the student's desk. An easel was available for the student to place on top of the desk to elevate the reading and mathematics material closer to eye level. The student was also directed to sit in front during carpet time. At the time of the research, the student was still being instructed in print and Braille reading with all testing done in print. The general education teacher was planning to suggest a change in the Individualized Education Plan for the student to make accommodations for further reading tests to be in Braille or listening for comprehension only.

Another student was quadriplegic, extremely medically fragile, and bound to a wheel chair. The student had a nurse, and a para –professional for medical and materials assistance.

This student's IQ was above average. The student was two grade levels behind due to previous inadequate academic placement. Since the student was new to the school and district, the student remained in the general classroom and the general education teacher consulted the special education teacher and occupational therapist as needed. The student only left the classroom to be catheterized and occasionally work with the occupational therapist specialist. The student was able to speak clearly and organize thinking, was able to turn pages in a book, and raise a tool to get the attention of the teacher. The student participated in all class discussions and activities with assistance from a para- professional and other students. The accommodations for this student consisted of a reduced school day, excused absence on Fridays, special bussing, scribed written work, a private room outside the classroom for catheterization, larger writing utensils for when the students did write, a flower pot filled with rice for the student to place and remove writing utensils, stationary scissors, extra work to be prepared in advance to send home, a bed placed in the classroom central to where students were located to allow a place for the student to lay when removed from the wheelchair, and movable activities able to be taken to the bed where the student was located for students to work with the student with the disability.

The classroom teacher had taught a total of 4 ½ years; all in the current district, with the first 4 years experience teaching 4th and 5th grades. The teacher had been working in the current school for 2 ½ years and was half way through the first year as a primary teacher in 2nd grade at the time of the research. The teacher had been trained and using GLAD for 2 ½ years.

Assumptions

Students in the study were at risk for poor performance on the Washington Assessment of Student Learning due to high poverty and limited English proficiency. Half of the students were only hearing one language spoken in the home while half were hearing both English and/ or

Spanish spoken at home. Students were expected to have been attending school on a regular basis during the study and have some background in science. Improvement in the post-vocabulary and post -content test score when compared to the pre -vocabulary and pre-content test score would imply an increase in the acquisition of the English language.

Hypothesis

Guided Language Acquisition Design strategies used in a fossil unit will increase student vocabulary and content knowledge in Earth Science as measured by parallel pre and posttests.

Null Hypothesis

Guided Language Acquisition Design strategies used in a fossil unit will not increase student vocabulary and content knowledge in Earth Science as measured by parallel pre and posttests.

Significance of the Project

The school district in this study had invested numerous resources into the Guided Language Acquisition Design project. Students previously observed appeared to respond well to the learning and teaching strategies. To date, the district has not specifically measured student achievement in comparison to Guided Language Acquisition Design instruction directly. Unit planning for Guided Language Acquisition Design has been used to align instruction to Grade Level Expectations. Grade Level Expectations were assessed by the Washington Assessment for Student Learning. Student's who were not passing the Washington Assessment for Student Learning, were affecting Annual Yearly Progress, causing the school and district to enter into School and District Improvement. The task of proving significance of the effectiveness of Guided Language Acquisition Design in regards to students acquiring vocabulary and content knowledge to help achieve better scores on the Washington Assessment of Student Learning has

seemed to be imperative. Due to No Child Left Behind, the efforts of administration and teachers have been focused toward improving student achievement on the Washington Assessment for Student Learning which made the significance of the project crucial.

Procedure

Preceding the Washington Science Teachers Association Conference in Spokane Washington, October of 2006, the school district curriculum administrator came to hear about a new Fossil Unit which had been created for use in schools to help teach Essential Academic Learning Requirements; GLE 1.3.5,"Know that fossils provide evidence of plants and animals that existed long ago" (2005, p. 32) and GLE, 1.3.9, "Know that fossils show how organisms looked long ago." (2005, p. 36) which to date, materials for teachers to teach the requirements to students, had not been available. The unit had been funded in collaboration by the U.S. department of Energy's Office of Science, the Office of Work Force Development for Teachers, and Scientists at Pacific Northwest National Laboratory. A team of Laser Science Teachers for Professional Development lead teachers researched and wrote the unit of study. (Barrom, et. al., 2006)

The curriculum administrator had been given a copy of the unit lessons and materials and gave the materials to the researcher to pilot in the classroom. The researcher then looked through the unit and aligned all activities to specific Grade Level Expectation's in Essential Academic Learning Requirement's one, two, and three in science for second grade. Seeing there was a GLE, 1.3.4, "know that rocks break down to form pebbles and sand." (2005, p. 32) which contained content related to the Fossil Unit content GLE's, the researcher then adapted lessons from *Land and Water*, (Land and Water, 2004) a Science and Technology Curriculum

kit, and Janice VanCleave's *201 Awesome, Magical, Bizarre, & Incredible Experiments*; "Breakdown" (VanCleave, 1999) to teach in conjunction with the Fossil Unit.

In order to further develop the Fossil unit for GLAD instruction, the researcher developed pictorials chants and songs, student awards, team task activities, and observation charts (Appendix pg. 60). Parallel pretest/posttests were written to assess the GLE's taught in the unit (Appendix pg. 55). The pretest was administered one week prior to the beginning of instruction. Make- up tests were given as soon as students returned. All enrolled students were given the pretest before the unit was started. Reasons not to include one student in the study, due to a shortened school day, were considered. The student was quadriplegic and did not attend school in the afternoons. The student only received instruction under the same conditions as the rest of the class one day a week. The researcher felt the student's assessments would not provide appropriate data for the study.

Pretest and posttest accommodations were as follows: All students were allowed to have test items including multiple choice answer selections read to students verbatim. An enlarged test was created for the student with a visual impairment. The test was administered whole group with the exception of the student with visual impairment and the autistic student who were given the test separately in a teacher to student setting within the classroom. The students who needed a make up test from being absent were given the test in a small group setting within the classroom.

The unit was taught to students during the time frame of March 8, 2007 through March 28th 2007. The pretest was administered on March 7th, 2007 and the posttest on March 30th, 2007. The Guided Language Acquisition Design strategies used were as follows, observation

charts, cognitive dictionary, pictorial input charts, chanting and singing, team tasks, and inquiry charts. The post assessment was given 2 days after the unit was completed.

Definition of Terms

balanced literacy. Balanced literacy contains multiple components of a literacy program. The components are guided reading, independent reading, shared reading, guided writing, independent writing, word study, modeled writing, and shared writing.

chanting and singing. Chanting and singing were Guided language Acquisition Design strategies used in the Fossil unit. The chants and songs helped include content vocabulary into a song or chant for students to learn and recall information later.

child study team. A child study team was made up of the school nurse, counselor, teachers and an administrator that meets to discuss issues with a student. This was the first step to a referral for special education.

cognitive dictionary. Cognitive dictionary was a Guided language Acquisition Design strategy used in the Fossil unit. A grid that asked the students to predict the meaning of a chosen word independently or in teams, then discussed the word with the teacher, sketched a picture, and finally used the word in a sentence.

Essential Academic Learning Requirements. Essential Academic Learning Requirements were the Washington State learning standards.

Grade Level Expectations. The Grade Level Expectations stemmed from Washington States Essential Academic Learning Requirements. Grade Level Expectations were expectations for the EALRS specific to each grade level.

inquiry charts. Inquiry charts were one of the Guided Language Acquisition Design strategies used in the Fossil unit. A tool (organizer) used for focusing background information,

setting students' purpose for learning, pre-assessing concepts, vocabulary, and information learned on a daily basis.

late exit bilingual model. Students in the bilingual program were not exited from bilingual classes until 6th grade. A pacing scale transitioned students from the first language into the second language over the course of 6 years.

observations charts. Observation charts were one of the Guided Language Acquisition Design strategies used in the fossil unit. The strategy contained live pictures of the subject matter. Students wrote down observations of the pictures without any prompts. This was an activity to begin students thinking.

pictorial input charts. Pictorial input charts were one of the Guided Language Acquisition Design strategies used in the Fossil unit. The strategy contained pictures of the subject matter, which were drawn in front of students for visual imprinting.

team tasks. Team tasks were one of the Guided Language Acquisition Design strategies used in the Fossil unit. Teams (group of students) worked on an activity that the teacher has modeled. Students were working towards being able to do the activity independently.

transitional bilingual. Students in a transitional bilingual program were taught primarily in the first language and transitioned into the second language based on the late exit bilingual model

Acronyms

CST. Child Study Team

EALR. Essential Academic Learning Requirement

ESL. English as a Second Language

GLAD. Guided Language Acquisition Design

GLE. Grade Level Expectation

L1. First language

L2. Second Language

LAS. Language Assessment Scale

LASO. Language Assessment Scale Oral

LEP. Limited English Proficient

LSTPD. Laser Science Teachers for Professional Development

NCLB. No Child Left Behind

OELA. Office of English Language Acquisition

STC. Science and Technology Curriculum

WASL. Washington Assessment of Student Learning

WLPT. Washington Language Proficiency Test

WSTA. Washington Science Teachers Association

CHAPTER 2

Review of the Literature

Introduction

"As more and more children entered schools from families in which English is not the language of the home, teachers faced the daunting challenge of instructing children who had limited skills in the English language "(Mclaughlin, 1992, p. 1). Students who had worked to learn English had struggled to do well in public school and on state tests. Many programs have existed to help teachers work with these students to improve scores, but most programs delivered only short- term results. Short -term results did not help students learn enough English to be successful on the WASL.

Second Language has not always been the only "hurdle" the students in the study have faced. Poverty was another for minority groups. "While the number of white children in poverty was the largest group, the percentage of children in poverty in most minority groups was higher" (Payne, 2001, p. 13). There were many factors that could prove helpful or not helpful for students who worked to acquire a second language. For the purpose of this study, educational research on acquiring a second language, the effects of poverty and language acquisition, brain research, and Guided Language Acquisition Design were reviewed.

Acquiring a Second Language

"The basic question that is central to all the studies of child second-language acquisition of this period is: What is it in the child's head that governs or guides what he/she learns?" (Costantino, 1999, p.9). Researchers have discovered problems with students who have had a primary language other than English. Lack of reading and writing background of students at the

middle school and high school levels come from limitations in vocabulary and syntactic knowledge in the second language (Mclaughlin, 1992). These limitations have caused second language learners to do poorly on the WASL since the test relied heavily on language proficiency. The new Title I law required each state to include LEP students into the state academic assessment system and assess the students appropriately (Menken, 2007). In the 1970's initial studies in language acquisition first took place. Information about the learner and teacher interaction as well as the child and parent interaction has been studied. Researchers looked for comparisons between structures in the first language (L1) and the second language (L2).

From these research studies four foundational theories became highly recognized models of how second-language development happened. The first of the four was called Creative Construction. With Creative Construction, students reconstructed rules for speech heard, causing students to reorganize and formulate the language inside students' heads eventually coming to a resolution of what was heard and what was said. This form was called creative, due to the process of construction only being known to the learner (Costantino, 1999). The second theory was called Error Analysis. Researchers analyzed the speech of second-language learners and concluded that there were similarities between the English and Spanish languages. The researchers in the 1970 study were able to conclude that L2 learners were making errors almost identical to the same as the L1 learners were. The implication for teachers was that the focus should have been placed on the developmental process of language acquisition. "The errors that a child produces provide a picture of the child's growing proficiency and should be used as insight into the instructional needs of the learner" (Costantino, 1999, p.11). Interlanguage, the third of the four theories, was the language the student developed that was not a true L1 or L2

language. This language was found to be used in communication as an attempt to acquire the L2, but was not an exact translation to either language (Costantino, 1999, p.11). The last of the four theories was called Linguistic Transfer. Linguistic Transfer occurred when the student was able to transfer the rules from the L1 to the production of L2 (Costantino, 1999).

There have been many ESL, Immersion, and Bilingual programs researched and tried by districts to increase language acquisition for students learning a second language. ESL programs have been more common in districts with a large variety of minority languages other than English. Bilingual programs have been used in districts with a large population of minority students with the same language background. The effectiveness of different program models for second language learners remained the subject of controversy. "Although there may be reasons to claim the superiority of one program model over another in certain situations, a variety of programs can be effective" (Rennie, 1993, p.1).

There were three ESL program models. The ESL pull-out model was more commonly used at the elementary school level. Students were taught primarily in a mainstream English speaking classroom, and then pulled out for part of each day to receive instruction in ESL by a different teacher. The ESL class period, another model, was mostly used in the middle schools. Students were scheduled for a regular class period in ESL and given course credit for the class. Students were grouped for instruction according to level of English proficiency. The third of the three was the ESL Resource Center, which was a variation of the pull-out model. Students from different classrooms and/ or schools came to one location which was staffed by an ESL teacher for concentrated ESL materials and instruction (Rennie, 1993).

Structured immersion programs emerged students into English classrooms with no explicit ESL instruction. English was taught to students through content areas from a teacher

who was certified in bilingual education or ESL. Use of the student's first language was only for clarification of English instruction. After two or three years, students in the immersion program entered into mainstream English classrooms (Rennie, 1993). Results have shown, by the end of elementary school, students in an immersion program were close to the level of native speakers in the understanding and reading of the majority language, but there were significant gaps between the second language learners and native speakers in spoken and written language [in the majority language] (Cummins, 2000).

Bilingual programs were most effective in districts with a significant number of students with the same language background. Bilingual teachers must have been proficient in both the students' home language and English. Early-Exit Bilingual Programs helped students develop English skills required to be successful in an English –only mainstream classroom. The program provided instruction in the first language, mainly in reading. Instruction in the first language was phased out quickly and students were exited into mainstream English classrooms by the end of first or second grade. The Late-Exit program was similar to the Early Exit program with the following differences. Students remained in Bilingual classrooms and continued in the program for the duration of elementary school. Then, after elementary school, students received forty percent more instruction in the first language even when the student had been reclassified as proficient in English. Two – Way Bilingual programs offered language proficiency in a second language to both minority and English speaking students. There was a fifty – fifty balance of the two languages. Instruction was both in English and the minority language spoken. Languages may have been spoken on alternating days or times of the day, but never was there the switching from one language to another within a lesson. Students and teachers served as native-speaker role models for students who needed modeling. In some cases the classroom was shared

between two teachers where each spoke one language. In a different situation, there was one teacher who spoke both languages (Rennie, 1993).

Sheltered English or content-based programs contained LEP students from different language backgrounds in a classroom setting where teachers used English to provide content area instruction. Language was adapted to the proficiency level of the students. Gestures and visual aids were used to help students understand. Language acquisition was the goal, but instruction focused on the learning of content instead of language (Rennie, 1993).

Second Language Learners needed time to become proficient in the English language. Importance for teachers to be sensitive to the language learning process students went through while developing proficiency in the English language was evident. Oral communication skills in L2 would have been acquired within two or three years, full acquisition of language took to four to six years to obtain the level of proficiency for understanding the language at an instructional level (Mclaughlin, 1992).

The Effects of Poverty

"People both within and outside the field of education sometimes attribute low academic achievement to a lack of effort or ability on the part of the individual, not considering seriously enough the systemic causes and effects of poverty." (Taylor, 2005, p. 3). An achievement gap has not only been established between second language learners and fluent readers and writers, but also between children of poverty and children of privilege. Students from affluent households have outperformed low-income students in all subjects (Taylor, 2005). Even though poor home experiences have not been the only cause of failure, statistically, a correlation exists between family income and a student ability to develop language (Haughey, et.al. 2001 p.3). There has been a trend in state test scores and the degree to which poverty effects the schools

ability to make AYP. The passage of the NCLB Act has moved educators toward narrowing the achievement gap between minority and students of poverty, and forced the mandatory disaggregation of student assessment data as part of the system of improvement. (Lyons, 2004) Test scores have been a factor in the search for best practices for schools entered into School Improvement.

The statistics have shown certain minority groups to be affected by poverty the most. African American and Latino children are disproportionately affected by poverty. (Taylor, 2005, p. 1) Sixty percent of students with high poverty backgrounds, were found to have been below a basic level in reading by the end of second grade. (Tivnan et. al. 2005) In 2002, sixty percent of African- American fourth graders scored below the basic level in National Assessment of Educational Progress (NAEP) reading. Fifty-four percent of 4th grade students, who took national assessments for fourth grade reading were eligible for free- or reduced-price lunch and scored at the lowest performance level which was below basic. (Tivnan et. al. 2005)

To determine the poverty levels in schools and the prediction of the levels of student achievement, family incomes have continued to be reliable indicators. " When education researchers want to measure the collective poverty level in a school, they typically use the same yardstick: the percentage of students who qualify for free or reduced-rate meals under the federal school lunch program." (Viadero, 2006, p. 1). Most researchers agreed, that lunch program indicators have not been extremely reliable due to lack of incentive for local officials to verify free and reduced-priced meals eligibility, and students who have chosen to be dropped from the program to hide economic status from peers (Viadero, 2006).

According to Ruby Payne, poverty has been defined as "the extent to which an individual does without resources" (Payne, 2001, p. 16). In most cases, poverty has been thought of in

terms of financial resources only, when there were many other resources to consider. Resources have been listed as being crucial to an upheld economic status. Financial, emotional, mental, spiritual, physical, support systems, relationships / role models, and knowledge of hidden rules were these resources. Connections between limited resources, low socioeconomic status, and low achievement have been noted to correlate and many studies have been proved. Students who were able to leave poverty were more dependent upon multiple other resources than singly upon financial resources (Payne, 2001).

Strategies have been proven to help students of poverty become successful at school. Cognitive strategies, ways information was processed, was important to teach for the storage of information for retrieval at a later time. Graphic organizers gave students the ability to identify and assign specific labels to concepts using a kinesthetic approach, and teaching mental models (Payne, 2001). A piece that has been especially important for schools serving children born into poverty has been finding a way to realistically deal with the huge differences in skill levels among the students and the constantly changing student populations (Pogrow, 2006). Students of poverty have been known to be highly mobile, moving from one school to another.

Brain Research

"In order to develop strategic competence in learning, children need to understand what it means to learn, who they are as learners, and how to go about planning, monitoring, revising, and reflecting upon their learning and that of others" (Bransford, et. al., 2000, p. 112). Second language learners needed to ground new ideas in current knowledge, which made learning meaningful, as students climbed the ladder of Bloom's Taxonomy (Lombardi, 2004). Benjamin Bloom described the taxonomy for organizing instructional objectives. The levels of the taxonomy were as follows: The lowest level was Knowledge. Students were able to remember

and recall facts. The next level was Comprehension. Students were catching the meaning of material, predicting outcomes and effects. In the level of Application, students were able to use learned material and apply the learning to a new situation. Analysis was the fourth level. Analysis involved breaking information down into parts and the ability to understand organization. Students were able to clarify and make conclusions. The next level was Synthesis. Students were able to put parts together to form a new meaning. Students understood abstract relationships. The final level was Evaluation. Students were able to judge the value of something for a purpose based on criteria and support the judgment with reason (Boone, et. al. 2005)

Blooms Taxonomy met a need for providing a basic planning tool to evaluate student learning. Teachers were soon aware of too much time spent on the "knowledge" level of learning, which was the lowest level of the taxonomy, and recognized a need for more creative higher level thinking to apply student knowledge (Gray, et. al. 2002). Students needed to understand the current state of knowledge, how to build on the knowledge and make improvements, and decisions when unsure (Bransford et. al., 2000, p. 132).

Changing learning activities and teaching strategies around learning styles have stimulated student thought and actions in the classroom (Lombardi, 2004). The brain has been proven to perform on many levels and in many ways at the same time. The transformation of verbal tasks into visual tasks, and visual tasks into kinesthetic tasks has stimulated student learning and made learning meaningful to the individual (Lombardi, 2004) Teachers have been continually challenged to find successful ways to meet the needs of the students (Shepard, 2004).

In 1983, the theory of multiple intelligences was developed by Dr. Howard Gardner. The premise of the theory was that students could learn and display knowledge in multiple ways

based on the students' intelligence strengths (Gray, et. al., 2002). The intelligences were verbal / linguistic, visual / spatial, musical / rhythmic, logical / mathematical, Body / kinesthetic, intra-personal, inter-personal and naturalist intelligences. Verbal / Linguistic intelligence was the ability to think in words and use language to determine meaning. Visual / spatial intelligence involved thinking three dimensions and the use of mental imagery, spatial reasoning, image manipulations, graphic and artistic skills, and active imagination. Musical / rhythmic intelligence was described as the ability to hear pitch, rhythm, tone, and timber. Students with musical intelligence could recognize, create, reproduce, and reflect on music. Logical / mathematical intelligence involved the ability to calculate, and perform complex mathematical operations. Body / kinesthetic intelligence was the capacity to manipulate objects and use a variety of physical skills. Intrapersonal intelligence was the ability to understand and interact effectively with others involving non-verbal and verbal communication and the ability to see various perspectives. Interpersonal intelligence was the capacity to understand the self, including thoughts and feelings, and to use this knowledge to plan and direct life. Naturalist intelligence was the ability to understand nature (Shepard, 2004).

Teachers who have taught to various learning styles and preferences have allowed students to express intelligences and abilities which in turn allowed students to participate in learning on many different levels (Shepard, 2004). In order to promote student learning, teachers have faced the challenge of planning what was taught, carefully choosing content and activities that were meaningful and purposeful to students. To aid in the success of students, teachers needed to organize teaching in a manner which promoted instruction that centered around essential concepts and organized how subject matter and skills were taught. Students needed to

be educated to think in meaningful ways (Gray, et. al. 2002). The hope was students would become self-motivated life long learners.

Organizing students in cooperative learning groups had a powerful effect on learning regardless of whether groups competed with one another (Marzano, et. al. 2001, p. 87). Students needed to be grouped heterogeneously, which meant students were organized by mixed ability levels, due to the fact that students in a strictly lower level group would not have the same experiences from students placed in a higher level group (Marzano, et. al. 2001). Low performing students performed better in heterogeneous groups (Marzano, et. al. 2001, p. 88). "Structuring the task, assigning roles and teams, sharing of materials, and requiring inter-dependability of team members are all essential to quality cooperative learning in the English as a Second Language (ESL) classroom (Lombardi, 2004, p.1).

Guided Language Acquisition Design:

Guided Language Acquisition Design was a very successful structured language immersion model (Project G.L.A.D., 2007). Marcia Brechtel and Linnea Haley were the creators of the program, which had received the United States Department of Education Project of Academic Excellence award. The California Department of Education named the program an Exemplary Program. Guided Language Acquisition Design had been a model reform program for the California School Reform Design as well as a training model for five Achieving Schools Award Winners. The program was the recommended K-8 project for the California State Superintendent's Task Force on successful implementation of Proposition 227 (Project G.L.A.D., 2007).

Guided Language Acquisition Design was a model, which included a compilation of new and original teaching and learning strategies designed to help all levels of LEP students become

successful with academic subjects while acquiring English vocabulary (Hansen, 2003). The success and use of language acquisition strategies was not limited to the ESL classroom (Brechtel, 2001). English speaking, Sheltered English, and Bilingual classrooms have used GLAD. The language strategies were just as effective for English speaking students as the strategies taught to more than one of the multiple intelligences and learning modalities that students had (Hansen, 2003).

Guided language Acquisition Design integrated many strategies which utilized different learning modalities and intelligences to aid in all students success. Many of the strategies were familiar to veteran teachers, but with slight differences, while other strategies were new (Hansen, 2003). Students who spoke little or no English were mixed together with English -speaking students. "Rather than teaching individual words and phrases in English and asking them [students] to form sentences, the program emphasizes oral skills first and sentence structure later, which is believed to be a more natural way of teaching language" (Apodaca, 1991, p. 1). The emphasis was on student – to- student communication.

An important and widely used strategy was to prompt students to explain and develop knowledge structures by teaching students to make predictions about various situations and to discuss the reasons for the predictions (Bransford, et. al., 2000, p. 134). Importance was given to creating a classroom environment which taught and promoted positive communication between students in the classroom (Brechtel, 2001). Students needed experience talking with peers in a low – anxiety situation in order to increase success (Hansen, 2003).

Strategies which included music, art, and chants, connected to the content, assisted students with learning and utilized multiple intelligences and modalities, offered differentiated instruction and access to rigorous learning for all students (Brechtel, 2001). Guided Language

Acquisition Design offered tools and methods which aided in success for all. Teachers needed to support student learning with strategies to organize thinking (Brechtel, 2001,). Graphic Organizers were such strategies. The Pictorial Input strategy was used as a preview exercise to provide background knowledge for content (Hansen, 2003, p. 37). "The process of talking to students about the concepts and drawing a picture at the same time appeals to both visual and auditory learners……it helps imprint the information in the brain, thus improving retention of the lesson's content" (Hansen, 2003, p. 38). Limited English Proficient students were allowed to discuss the pictorial input charts in L1, in order to focus on the meaning of what was being taught, instead of how to correctly say the words in English. This enabled students to communicate any knowledge previously acquired in the native country, which was unable to be clearly spoken out in English (Hansen, 2003). When content was frontloaded, by integrating graphic organizers, introducing vocabulary, using prediction strategies and allowing students to communicate to share ideas, the brain was better prepared for the new knowledge to come (Lombardi, 2004).

Project GLAD also consisted of a staff- training model. Teachers were trained to modify the delivery of instruction to support literacy and academic language. In GLAD training, teachers were taught the theory, practical use, and effective strategies that supported academic language, literacy, academic achievement, and cross-cultural skills. Teachers and administrators learned to use district and state standards aligned to curriculum to provided for multi-lingual classrooms (Project G.L.A.D., 2007).

Training consisted of four components; what GLAD was, how and why GLAD was used, follow up and coaching, and becoming a key trainer. The first component was to teach the teachers being trained what GLAD was. The next was to teach how GLAD was to be used in the

classroom. Theory and research behind the strategies was presented to participants. The strategies were then modeled in a live classroom during the morning for one week by two key trainers. One key trainer was working with the students while the other trainer was in the back of the room with the participants of the training, explaining the strategies being demonstrated. The afternoons during the week were used as feedback and collaboration time. Participants were able to begin to create GLAD units with the help of the key trainers. The third component was Follow-up and Coaching. The trainers visited classrooms to assist GLAD teachers and provide encouragement. The coach made observations and provided feedback on strategies or techniques that were specifically requested by the teacher. The last of the four components of GLAD training was becoming a key trainer. If a teacher was interested in becoming a certified Key Trainer, the following qualifications had to be met:

1. Must have been designated by the district to become a Key Trainer.
2. Must have committed to working in teams of two or more.
3. Must have committed to further training.
4. Must have had a minimum of six months experience using GLAD in the classroom.
5. Gave 2 to 4 practice demonstration lessons with a team partner.
6. Gave 2 to 4 practice in-services presenting theory, research and classroom application with a team partner.
7. Must have been evaluated by another Key GLAD Trainer when giving a presentation of a workshop and demonstration session (Project G.L.A.D., 2007).

Training resulted in a renewed commitment to high expectations from teachers, which in turn held high standards for students. Student results have been continued gains in standardized

test scores and involvement in a student-centered classroom, which celebrates student identity and participation (Project G.L.A.D., 2007).

Summary:

An achievement gap has not only been established between second language learners, but also between children of poverty and children of privilege (Taylor, 2005). Statistics have shown certain minority groups to be affected by poverty the most (Payne, 2001). Students of poverty and second language learners appeared to perform better when taught using different modalities and multiple intelligences. Teachers who have taught to various learning styles and preferences have allowed students to express intelligences and abilities which in turn allowed students to participate in learning on many different levels (Shepard, 2004).

Second language learners needed to ground new ideas in current knowledge, which made learning meaningful, as students climbed the ladder of Bloom's Taxonomy (Lombardi, 2004). Oral communication skills in L2 would have been acquired within two or three years, full acquisition of language took to four to six years to obtain the level of proficiency for understanding the language at an instructional level (Mclaughlin, 1992).

Teachers have been continually challenged to find successful ways to meet the needs of the students (Shepard, 2004). The effectiveness of different program models for second language learners remained the subject of controversy. Guided Language Acquisition Design strategies which included music, art, and chants connected to the content, assisted students with learning and utilized multiple intelligences and modalities, offered differentiated instruction and access to rigorous learning for all students (Brechtel, 2001).

CHAPTER 3

Methodology and Treatment of Data

Introduction

The administrators and teachers invested in GLAD needed to know if the program was making a difference in student achievement. According to the Washington State Report Card, the school and district in the study were not making AYP. (Washington State Report Card 2006). The need for taking a closer look at the effectiveness of GLAD was an interest to the researcher.

A fossil unit (Barrom, et. al., 2006) was taught using GLAD strategies. The unit aligned to 8 second grade science GLE's. Students were assessed before instruction with a pretest and after instruction with a posttest. Results were compared quantitatively using a *t*-test to analyze the pretest and posttests. Students were also given a short survey at the end of the unit containing five questions.

Methodology

The author used a quasi- experimental design. The purpose of the study was to determine if GLAD was making a difference in student learning. A class of second grade students were administered a pre-test, taught the content through the use of GLAD strategies, administered a post test, and given a survey to complete. The students were all from the same classroom in the same school. There was no control group.

Participants

The study was conducted in a large district in Eastern Washington. The district had a 68.6 % Hispanic population and 66.7 % free or reduced lunch population. The percent of students considered transitional bilingual was 36.1 %. Students who were migrant consisted of 17.7 % of the district population. The students in the study were from one of the district's

highest Hispanic populated as well as highest free and reduced meal populated elementary schools. (Washington State Report Card 2006).

This classroom had a high content of special needs students. Four students received services for speech. Two students were currently receiving services from the special education teacher at the time of the research. One student was receiving occupational therapy services and had an Individualized Education Plan, but did not receive services from the special education teacher. An Individualized Education Plan was written for students who qualified for Special Education. Disabilities, modifications, and accommodations were written specific to each student. Academic goals were set and evaluated regularly for each student.

Eleven students were Limited English Proficient status. Limited English Proficient students had been identified by the Language Assessment Scale Oral test given when the students first entered the school district. The test measured receptive and expressive language. Various aspects of language were tested separately in individual subtests. Scores were weighted and combined into one total proficiency level for each language component. Students were scored in a 1 to 5 scale. The score of 1 was considered a Non-English speaker. Students' who had a score of 2 or 3 were considered Limited English Proficient and a score of 4 or 5 was considered to be a fluent English speaker. One students qualified, with a score of 1 on the LASO, but was pulled from the transitional bilingual program in Kindergarten per parent request. Another student qualified for the transitional bilingual program but never entered per a decision made by a Child Study Team with parent consent due to the student's disability. Accommodations for all Limited English Proficiency students consisted of reading test items for the Washington Assessment of Student Learning some bilingual para-educator support, and Guided Language Acquisition Design instruction.

One student was mildly autistic with a deficiency in social skills and minimal uncontrolled outbursts. The student struggled with change. This student received services in special education for social skills, speech, reading, writing, and mathematics. The student was pulled out of the general classroom 1 hour a week for social skills, 30 minutes per week for reading and 30 minutes per week for mathematics. Writing instruction was solely from the general education teacher with a para-educator in the general classroom 180 minutes per week. The para-educator worked with another student during this time as well. The student with autism was considered to be on second grade level in reading, writing, and mathematics, by the general education teacher. Accommodations for the students were careful monitoring of the students' interaction with the rest of the class, special attention to directly teaching appropriate social interaction, general education teacher collaboration with the social thinking skills teacher and the resource room teacher to coordinate consistent use of language.

One student was legally blind, but had some vision and could maneuver around the classroom unassisted. The student received special services for learning Braille reading 225 minutes per week. The student also qualified and received services from a special education resource room in reading for 90 minutes per week as well as in mathematics for 90 minutes per week. The general education teacher instructed the student in writing with a para-educator in the general classroom 180 minutes per week. The para-educator worked with another student during this time as well. Accommodations in the general education classroom for the student consisted of all reading and mathematics material being blown up to at least forty-eight sized font and a magnifying glass was available for the student to use in addition to reading glasses. The student's desk was located at the front of the room in order to be able to see the overhead screen, but consideration of the student not being able to see everything was addressed with a large print

size copy being placed in front of the student at the student's desk. An easel was available for the student to place on top of the desk to elevate the reading and mathematics material closer to eye level. The student was also directed to sit in front during carpet time. At the time of the research, the student was still being instructed in print and Braille reading with all testing done in print. The general education teacher was planning to suggest a change in the Individualized Education Plan for the student to make accommodations for further reading tests to be in Braille or listening for comprehension only. The student was not present for all of the instruction of the unit for the experiment due to science time conflicting with the student's time in the resource room. The student took the pretest and posttest and the scores were included in the study results.

Another student was quadriplegic, extremely medically fragile, and bound to a wheel chair. The student had a nurse, and a para –professional for medical and materials assistance. The student attended school half days per the medical condition and was only present for 3 days of instruction. The student did not take the pretest or posttest therefore the student's scores were not included in the experiment results.

The classroom teacher had taught a total of 4 ½ years; all in the current district, with the first 4 years experience teaching 4th and 5th grades. The teacher had been working in the current school for 2 ½ years and was half way through the first year as a primary teacher in 2nd grade at the time of the research. The teacher had been trained and using GLAD for 2 ½ years.

Instrument

The study included 5 instruments: a pre-vocabulary test, post- vocabulary test, pre-content test, post-content test, and a student survey. The author developed the survey and tests. The tests were administered to the students under the same conditions with appropriate accommodations for LEP students and students with disabilities. Make up tests for students who

were absent during the time of testing were administrated under the same conditions, but in a small group setting.

The content pretest and posttest contained short answer and multiple choice questions, as well as drawing and labeling, and comparing differences with a *t*-chart. All test items were designed to assess the 2nd grade GLE's that were previously aligned by the author to the unit of instruction. (appendix p. 50) The pretest had one extra item, which was not scored. The students were asked to write one question about fossils. The task was only for the teacher's information, and was not included in the scoring of the test. The tests were parallel. Both the pretest and the posttest contained 1 drawing and labeling item, 3 short answer questions, 2 multiple choice questions, and 1 t-chart item. Both tests contained 6 items that were scored. Each item had a point value. Short answer questions were 2 points. Multiple- choice questions were 1 point. The drawing and labeling item was 4 points. The t-chart comparison was 6 points. The total value of each test was 16 points.

The pre vocabulary test and post vocabulary test consisted of 7 questions. All the questions pertained to the vocabulary used in the fossil unit, which were also necessary for the understanding of the content that was aligned to 2nd grade GLE's. The questions were all multiple-choice. Each question was 1 point. The total value of each test was 7 points.

The survey consisted of 5 questions asking for student's feelings regarding the learning experience and use of GLAD strategies. The survey was in a multiple -choice picture format. Students chose from yes, with a smiley face, maybe, with a straight face, or no, with a sad face.

Design

The author used a pretest and posttest quantitative design. The design was used to measure the amount of vocabulary and content knowledge students retained from instruction

using GLAD strategies. The author also used qualitative research measuring student opinion of the use of GLAD strategies.

Procedure

Preceding the Washington Science Teachers Association Conference in Spokane Washington, October of 2006, the school district curriculum administrator came to hear about a new Fossil Unit which had been created for use in schools to help teach Essential Academic Learning Requirements; GLE 1.3.5, "Know that fossils provide evidence of plants and animals that existed long ago" (OSPI, 2005, p. 32) and GLE 1.3.9, "Know that fossils show how organisms looked long ago." (OSPI, 2005, p. 36) which to date, materials for teachers to teach the requirements to students, had not been available. The unit had been funded in collaboration by the U.S. Department of Energy's Office of Science, the Office of Work Force Development for Teachers, and Scientists at Pacific Northwest National Laboratory. A team of Laser Science Teachers for Professional Development lead teachers researched and wrote the unit of study. (Barrom, et. al., 2006)

The curriculum administrator had been given a copy of the unit lessons and materials and passed gave the materials to the researcher to pilot in the classroom. The researcher then looked through the unit and aligned all activities to specific Grade Level Expectation's in Essential Academic Learning Requirement's one, two, and three (appendix p. 50) in science for second grade. Seeing there was a GLE, 1.3.4, "know that rocks break down to form pebbles and sand." (OSPI, 2005, p. 32) which contained content related to the Fossil Unit content GLE's, the researcher then adapted lessons from *Land and Water,* a Science and Technology Curriculum kit, and Janice VanCleave's *201 Awesome, Magical, Bizarre, & Incredible Experiments*; "Breakdown" (appendix p 68-73) to teach in conjunction with the Fossil Unit.

In order to further develop the Fossil unit for GLAD instruction, the researcher developed pictorials (appendix p.57-58), observation charts (appendix p. 57), cognitive dictionary (appendix p. 59), KWL chart (appendix p. 59), chants and songs (appendix p. 64-65) and student learning logs (appendix p. 60-63). Parallel pretest/posttests were written to assess the GLE's taught in the unit (appendix p. 51-54). The pretest was administered one week prior to the beginning of instruction. Make- up tests were given as soon as students returned. All enrolled students were given the pretest before the unit was started. Reasons not to include one student in the study, due to a shortened school day, were considered. The student was quadriplegic and did not attend school in the afternoons. The student only received instruction under the same conditions as the rest of the class one day a week. The researcher felt the student's assessments would not provide appropriate data for the study.

Pretest and posttest accommodations were as follows: All students were allowed to have test items including multiple choice answer selections read to students verbatim. An enlarged test was created for the student with a visual impairment. The test was administered whole group with the exception of the student with visual impairment and the autistic student who were given the test separately in a teacher to student setting within the classroom. The students who needed a make up test from being absent were given the test in a small group setting within the classroom.

The unit was taught to students during the time frame of March 8, 2007, through March 28, 2007. The pretest was administered on March 7, 2007 and the posttest on March 30, 2007. The survey was administered following the posttest on March 30, 2007 . The Guided Language Acquisition Design strategies used were as follows: observation charts, cognitive dictionary, pictorial input charts, chanting and singing, team tasks, learning logs, KWL chart and inquiry

charts. The post assessment was given 2 days after the unit was completed. The student survey was administered at the conclusion of the post assessment (appendix p. 55).

Treatment of Data

All pretest and posttests were hand scored by the author. Vocabulary pretests and posttests were given a score between 0 and 7 points. Content pretests and posttests were given a score between 0 and 16 points. Once all tests were scored and recorded, the author first ran a mean and standard deviation statistical test. The author then performed a statistical *t*-test using the Stat pak program. The author used the distribution of *t* reference table to determine significance. (Gay, et. al., 2006)

The surveys were tallied. The author created a table with a row for each question and columns for yes, maybe, and no. The author kept a tally of the amount of yes, maybe, and no answers for each question. Results were made into a graph for further analysis.

Summary

The purpose of the study was to determine if GLAD was making a difference in student learning. A fossil unit was embellished with GLAD teaching strategies by the author. A team of Laser Science Teachers for Professional Development lead teachers researched and wrote the unit of study. The unit had been funded in collaboration by the U.S. department of Energy's Office of Science, the Office of Work Force Development for Teachers, and Scientists at Pacific Northwest National Laboratory (Barrom, et. al., 2006). Students were instructed over a 3 week period. Students were assessed using a pretest and posttest for vocabulary and content. Appropriate accommodations were made for students with disabilities and LEP students. All test items were written by the author and designed to assess the second grade GLE's that were previously aligned by the author to the unit of instruction. A statistical *t*-test using the Stat pack

program was used. The author used the distribution of *t* reference table to determine significance. (Gay, et. al., 2006)

CHAPTER 4

Analysis of the Data

Introduction

The study looked at student scores from a pretest and posttest to determine if students made significant improvement. Sixteen 2nd grade students participated in the research study to determine if GLAD made a difference in student achievement in science. The unit used was aligned to second grade GLE's pertaining to weathering and fossils.

The teacher who was included in the study had been GLAD trained for 2 ½ years prior to the study. The administrators and teachers in the school and district were committed to using GLAD in the classroom. Administrators believed the program to be best for all students.

Description of the Environment

Students studied were in 2nd grade. The classroom consisted of 20 students at the beginning of the study. During the study, 2 students withdrew from the school, and one new student enrolled bringing the class number to 19. One student missed 3 days of instruction. Three students were excluded from the pretest and posttest portion of the study. One student only participated in one science lesson a week due to a reduced school day, another student entered into the classroom a week after the study began, and the other student was absent the last two days of the study and missed the posttest. There was not sufficient time to wait for the student to return to give a make-up posttest. In the end, 16 students participated. Special accommodations for students with disabilities were made as discussed in Chapter 1.

The students had variations to the normal classroom schedule during the study. A half - day schedule occurred for 4 days during parent-teacher conference week. Students arrived at school at the regular time, but left preceding lunch at 12:30. The academic schedule had to be

altered during conference week. Science was moved to the morning instead of the afternoon during this week.

The elementary school where the study took place consisted of 517 students. The Hispanic population was 91.7 % with 61.8 % being enrolled in a transitional bilingual program. 88.3 % of students qualified for free or reduced-priced meals. (OSPI, 2006)

Hypothesis

Guided Language Acquisition Design strategies used in a fossil unit will increase student vocabulary and content knowledge in Earth Science as measured by parallel pretest and posttests.

Null Hypothesis

Guided Language Acquisition Design strategies used in a fossil unit will not increase student vocabulary and content knowledge in Earth Science as measured by parallel pretests and posttests.

Results of the Study

Table 1.

t- test of Pre-Post Test Results for the Fossil Unit Vocabulary

Test	N	Mean	Standard deviation
Pre	16	3.44	1.80
Post	16	6.31	1.04
df = 15		t = 5.76	p<.001

After scoring the vocabulary pretest and posttest , Table 1 indicated the results of the analysis. The null hypothesis was rejected. There was a significant difference in student achievement when vocabulary pretest and posttest scores were compared.

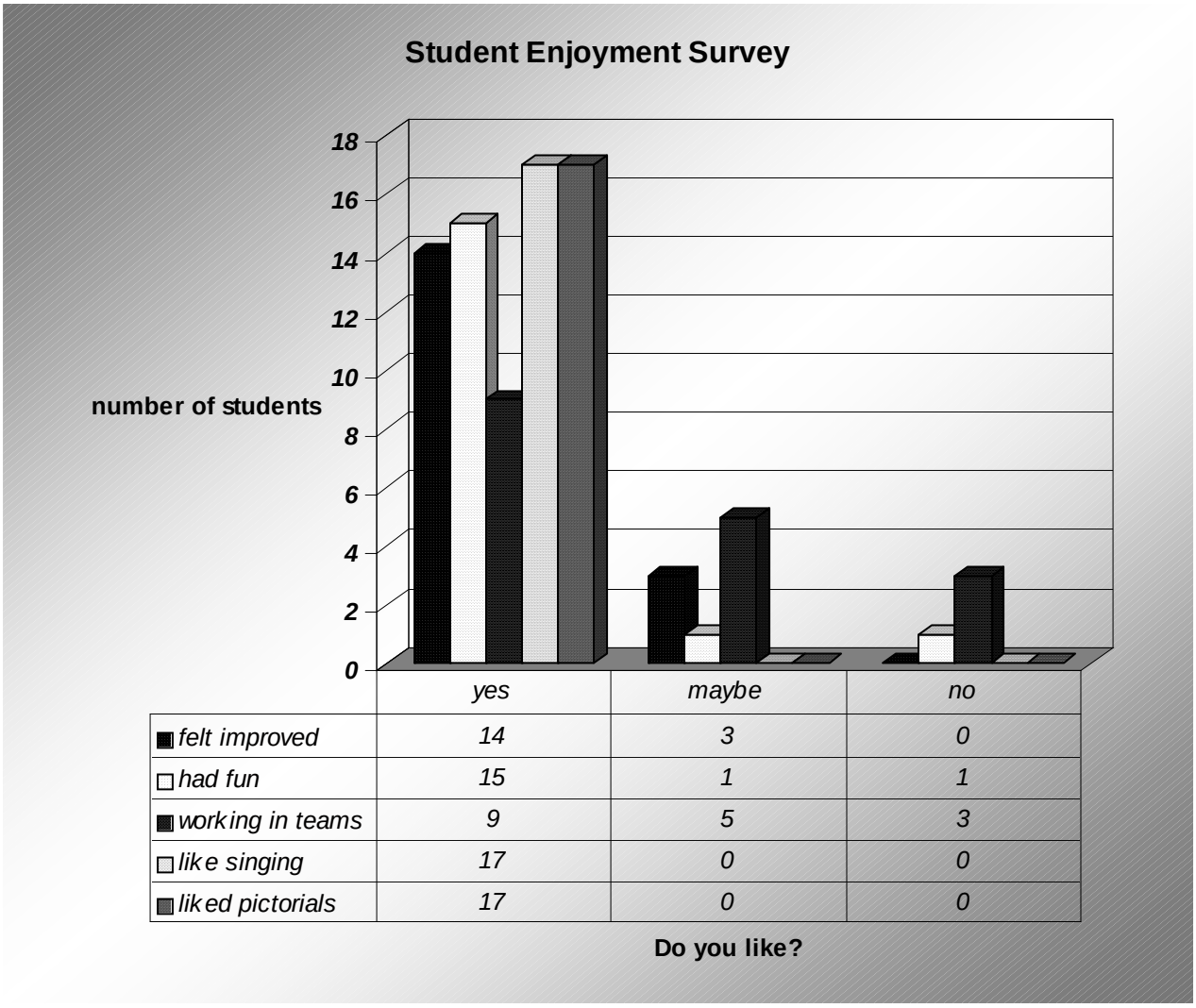
Table 2.

t- test of Pre-Post Test Results for the Fossil Unit Content

Test	N	Mean	Standard deviation
Pre	16	5.38	1.54
Post	16	12.44	3.08
df = 15		t = 9.03	p<.001

After scoring the content pretest and posttest, Table 2 indicated the results of the analysis. The null hypothesis was rejected. There was a significant difference in student achievement when content pretest and posttest scores were compared.

Figure 1.



	yes	maybe	no
felt improved	14	3	0
had fun	15	1	1
working in teams	9	5	3
like singing	17	0	0
liked pictorials	17	0	0

After student surveys were analyzed, Figure 1. indicated the level of student enjoyment during instruction of the Fossil Unit. Seventeen students were present for the survey. Students appeared to enjoy the fossil unit. A result that surprised the author was the high number students who did not enjoy working in teams.

Findings

The results indicated that Guided Language Acquisition Design strategies used in the fossil unit increased student vocabulary and content knowledge as measured by parallel pre and

posttests. Students were observed using the scientific vocabulary in group discussions and using information to ask new questions. The participants, except for 2 students, appeared to master content knowledge for the GLE's indicated as being taught in the fossil unit. (Appendix p. 56)

Although the study group did show significant growth, the results could not only be attributed to GLAD strategies. The students in the study, had limited background knowledge of fossils, weathering, and erosion as indicated by the pretest. Students could have attained knowledge from other media sources which were included in the fossil unit. Short video clips were also included to further illustrate concepts related to how the Earth changes. Changes of the Earth was not a second grade GLE, but the teacher believed students needed to view a video clip to demonstrate the abstract concept. Due to the excitement level of the new science unit, students began checking out content related books at the library and bringing books from home.

Discussion

The results supported the research on effective strategies for teaching. Guided Language Acquisition Design incorporated many effective teaching and learning strategies with the use of different learning modalities and multiple intelligences aiding in success for all students. Students enjoyed learning and continued to ask scientific questions.

Summary

Students in the classroom study showed improvement in vocabulary and content knowledge of fossils in Earth Science as measured by parallel pre and posttests. Guided Language Acquisition Design appeared to contribute to an increase in student achievement.

CHAPTER 5

Summary, Conclusions, and Recommendations

Introduction

Education has gone through constant changes over the years. Standards for teachers and students have been established by the Office of the Superintendent of Public Instruction. As more accountability has been placed on the shoulders of districts and schools, "The art of teaching is rapidly becoming the science of teaching" (Marzano, 2001, p. 1). Students and teachers have been held to a new and higher standard regardless of socioeconomic status and language proficiency.

The authorization of No Child Left Behind had left many states to make much needed changes in the way teachers taught all, but more specifically, second language students and prepared students for the mandated assessments. Guided Language Acquisition Design strategies have proven to help teachers and students alike make preparations for WASL.

Summary

Schools in the area of this study, areas of high poverty and second language populations, have struggled to meet Annual Yearly Progress as measured by the Washington Assessment of Student Learning (OSPI, 2006). "The passage of No Child Left Behind (NCLB 2002) has carried sweeping educational reforms, and a focus on standardized testing that is now being felt on a daily basis in schools and classrooms across the United States" (Menken, 2007 p. 1).

Teachers have been continually challenged to find successful ways to meet the needs of students (Shepard, 2004). The effectiveness of different program models for second language learners remained the subject of controversy. For students learning a new language, oral communication skills in L2 would have been acquired within two or three years, full acquisition

of language took to four to six years to obtain the level of proficiency for understanding the language at an instructional level (Mclaughlin, 1992). Guided Language Acquisition Design strategies which included music, art, and chants, connected to the content, assisted students with learning and utilized multiple intelligences and modalities, offered differentiated instruction and access to rigorous learning for all students (Brechtel, 2001).

The brain has been proven to perform on many levels and in many ways at the same time. The transformation of verbal tasks into visual tasks, and visual tasks into kinesthetic tasks has stimulated student learning and made learning meaningful (Lombardi, 2004). Integrating multiple intelligences into teaching and learning improved student learning.

The study determined if Guided Language Acquisition Design instruction was improving second grade student comprehension of content vocabulary and information as required by GLE's which in turn would increase achievement on the WASL. The purpose of the research was to determine if students would improve scores from a pretest to a posttest after an earth science unit was taught using Guided Language Acquisition Design.

The study was conducted in a large district in Eastern Washington. The district had a 68.6 % Hispanic population and 66.7 % free or reduced lunch population. The percent of students considered transitional bilingual was 36.1 %. Students who were migrant consisted of 17.7 % of the district population. The students in the study were from one of the district's highest Hispanic populated as well as highest free and reduced meal populated elementary schools. (OSPI, 2006). Students studied were in second grade.

The study included 5 instruments: a pre-vocabulary test, post- vocabulary test, pre-content test, post-content test, and a student survey. The author developed the survey and tests.

The tests were administered to the students under the same conditions with appropriate accommodations for LEP students and students with disabilities.

The results indicated that Guided Language Acquisition Design strategies used in the fossil unit increased student vocabulary and content knowledge significantly as measured by parallel pre and posttests. Students were observed using the scientific vocabulary in group discussions and using information to ask new questions. The participants appeared to master content knowledge for the GLE's indicated as being taught in the fossil unit. (Appendix, p. 52) The results supported the research on effective strategies for teaching. Guided Language Acquisition Design incorporated many effective teaching and learning strategies with the use of different learning modalities and multiple intelligences aiding in success for all students.

Conclusions

In conclusion, the Guided Language Acquisition Design program was very effective in increasing student achievement in vocabulary and content knowledge of fossils. The conclusion was based on the results of the pretest and posttest scores for both vocabulary and content assessments for the fossil unit. Students showed higher scores on the posttests than the pretests as determined by the statistical *t*-test. Strategies were rooted in best practices catering to the multiple intelligences supported in brain research. Students also enjoyed participating in the learning. When given the survey, students responded positively toward the GLAD strategies used.

The author observed LEP students confidently speaking in small groups, using the content vocabulary and language of instruction, and volunteering to share out in front of the whole group. Students were willing to negotiate for meaning when meanings were unclear.

Pride was taken in student work. Learning logs were accurately made and reflected the charts which hung all around the room.

Recommendations

Future research needs to be done to gather more data on the effectiveness of GLAD. GLAD has proven to be effective for both LEP students and native English speakers as well, as a result of this study.

The author believes there to be other methods to use to prove GLAD to be an exemplary program. Using a pre and posttest design with no control group, leaves variables to argue the program's effectiveness. An argument could be made, that improvement on the posttest was only because students were taught the content, and that GLAD wasn't the difference, just plain teaching was. Future research should include a control classroom that does not use GLAD strategies to parallel the experimental classroom that does, so this argument could be laid to rest. Another method could be for future researchers to compare student scores, who have attended school in GLAD classrooms on the WLPT or WASL. Future research needs to include different age groups as well. The current study was limited to second grade students. Higher level content with older students may prove to be a better indicator of the program's success.

The research conducted in the study proved to be effective for all who participated. GLAD strategies raised the confidence and enjoyment levels of students and the teacher. Students took charge of the learning and were challenged with high- level content through strategies that were research based. Guided Language Acquisition Design does make a difference in student achievement.

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APPENDIX

2nd Grade Fossil Unit GLE's

Content GLE's 1.1.1, 1.3.9, 1.3.4, 1.3.5,

1.1.1 Understand simple properties of common natural and manufactured materials and objects

- **Sort common objects by multiple simple properties.**
- **Identify and describe the differences between common and natural and manufactured materials and objects using properties.**

1.3.9 Know that fossils show how organisms looked long ago.

- **Observe and record how fossils are similar to living organisms (leaves, shells)**

1.3.4 Know that rocks break down to form pebbles and sand.

- **Describe how rocks can break down into smaller pieces (pebbles and sand) by the action of water.**

1.3.5 Know that fossils provide evidence of plants an animals that existed long ago.

- **Identify a fossil in a rock.**
- **Compare fossils with similar living organisms (a fossil with a leaf, fossil shell with a shell)**

Other GLE's that Align with this unit:

2.1.1 Understand how to ask a question about objects, organisms, and events in the nvironment

- Wonder and ask questions about objects, organisms, and events based on observations of the natural world.

2.1.4 Understand that odels represent real objects events, or processes

- Describe how a model of something is similar to the real thing, such as an object event, or process, and how it is different (size, shape, color)
- Create a simple model of a common object, event or process.

2.1.5 Understand how to record and report investigations, results, and explanations

- Report observations with drawings and simple sentences.
- Describe and draw the materials used in the investigation.
- Report the process used and results of the investigation.

2.2.4 Know that ideas in science change as new scientific evidence arises.

- Tell how scientific inquiry results in facts, unexpected findings, ideas, evidence, and explanations.

Name: _____

Student # _____
Score: _____

Fossil Vocabulary Pretest

1.) What is the meaning of ***fossil*** ?
   a. A type of dirt.
   b. A Large rock.
   c. A part of an organism from the past.
   d. I don't know.

2.) What is the meaning of ***extinct***?
   a. An organism that is no longer living.
   b. An object that has a strange smell.
   c. A spot that has an X on it.
   d. I don't know.

3.) What is the meaning of ***paleontologist***?
   a. A type of soil.
   b. A fossil scientist.
   c. A special bucket.
   d. I don't know.

4.) What is a **property** in science?
   a. A piece of land.
   b. A word to describe an object.
   c. Something that looks good.
   d. I don't know.

5.) What is the meaning of ***organism***?
   a. Something that is or was living.
   b. An object that makes noise.
   c. A musical instrument.
   d. I don't know.

6.) What is the meaning of **habitat**?
   a. A habit that won't go away.
   b. An animal
   c. A place where plants and animals live together.
   d. I don't know.

7.) What is the meaning of ***geologist***?
   a. A scientist who studies rocks on the surface of the earth to learn more about the earth and its history.
   b. A study of geo-blocks
   c. Making a list of rocks.
   d. I don't know.

Name: _____

Student # _____
Score: _____

Fossil Vocabulary Posttest

1.) What is the meaning of ***geologist***?
   a. A scientist who studies rocks on the surface of the earth to learn more about the earth and its history.
   b. A study of geo-blocks
   c. Making a list of rocks.
   d. I don't know.

2.) What is the meaning of ***extinct***?
   a. An organism that is no longer living.
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7.) What is the meaning of ***paleontologist***?
   a. A type of soil.
   b. A fossil scientist.
   c. A special bucket.
   d. I don't know.

Name: _____

Fossils Pretest

2nd grade

1. Draw and label a picture of the leaf and leaf fossil.

2. What are the differences between the leaf and the leaf fossil?

Leaf	Leaf fossil

3. What happens to land and rocks over a long time? Circle the best answer.
    a. The rocks and land grow
    b. The rocks and land stay the same
    c. The rocks and land break down into smaller pieces
    d. I don't know

4. What does weathering mean? Circle the best answer.
    a. When it hails ice the size of small rocks.
    b. When the sun is very bright
    c. When rocks are broken down into sand and pebbles.
    d. I don't know

5. What things can people learn from fossils?

6. How are fossils like living things that we have today?

Name: _____ Date: _____

Fossils Postest

2nd grade

1. What things do scientists learn from fossils?

2. How are fossils like living things that we have today?

3. Draw and label a picture of the fish and trilobite fossils

4. What are the differences between the fish and the trilobite fossil?

Fish fossil	Trilobite fossil

5. What happens to land and rocks over a long time? Circle the best answer.

   a. The rocks and land grow

   b. The rocks and land break down into smaller pieces

   c. The rocks and land stay the same

6. What happens during the weathering and erosion process? Circle the best answer.

   a. Rocks break down into smaller pieces and are washed away by the rain.

   b. The land floods

   c. The wind blows and rolls rocks into the ocean.

Student Survey

Do you think your improved your learning since the first test?

Yes ○ Maybe ○ No ○

Was learning about fossils fun?

Yes ○ Maybe ○ No ○

Did you like working in your teams?

Yes ○ Maybe ○ No ○

Did you like singing the chants?

Yes ○ Maybe ○ No ○

Did you like it when your teacher drew the pictures?

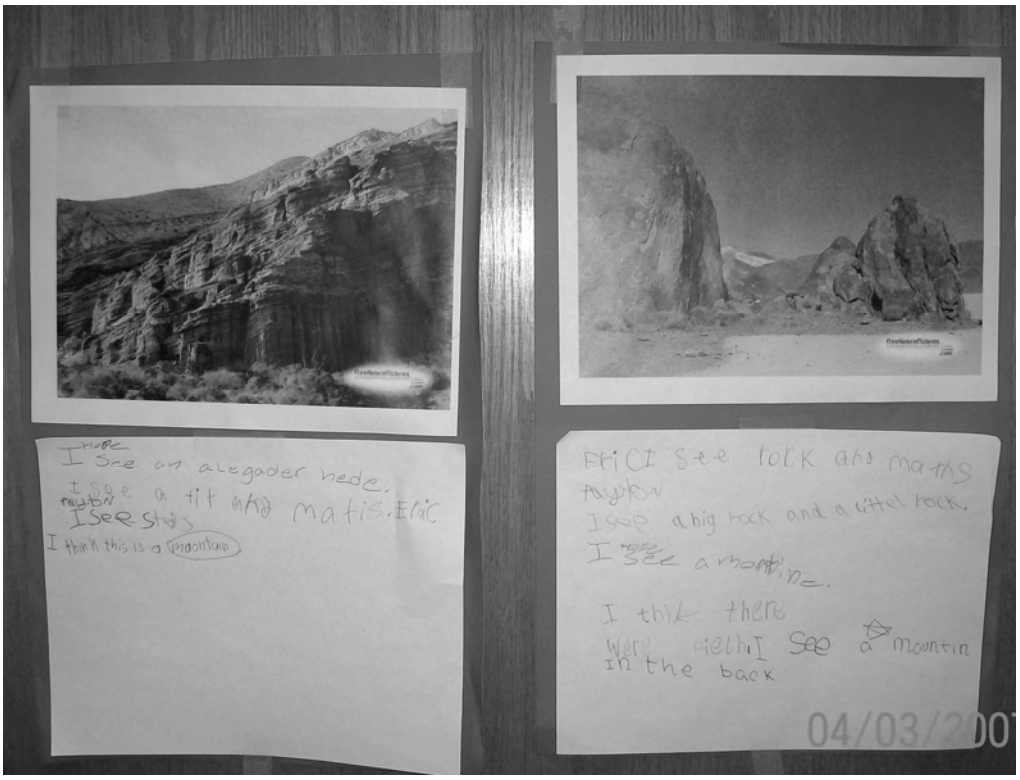
Yes ○ Maybe ○ No ○

Student Scoring Record Sheet

Student #	7points possible	7 points possible	16 points possible	16 points possible
1	6	7	4	16
2	4	7	5	10
3*	3	5	6	6
4	4	7	6	16
5	7	7	7	16
6	3	7	6	16
7	5	7	7	14
8	5	6	7	14
9*	3	3	3	7
10	3	6	7	14
11	2	7	5	12
12	0	7	6	10
13	4	6	6	11
14	3	6	2	14
15	3	7	3	10
16	0	6	6	13
17*	3	Absent	4	absent
	Pre-Vocabulary	Post-Vocabulary	Pre-Content	Post-Content

* Student 3 missed 3 days of instruction.
*Student 9 was not in the classroom for a lot of instruction time due to being pulled for the resource room.
* Student 17 was excluded from the statistical test due to extended absence and inability to take the posttest.

A sample of Observation Charts:

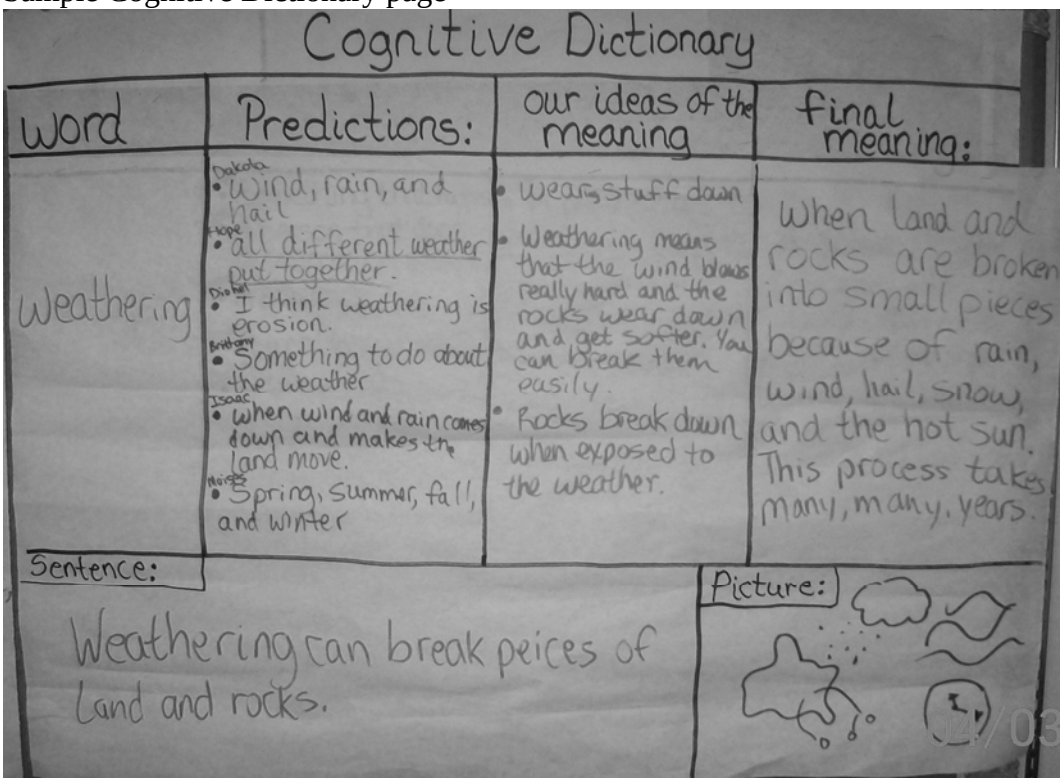


Pictorial Input chart 1

Pictorial Input chart 2

Pictorial Input chart 3

Sample Cognitive Dictionary page



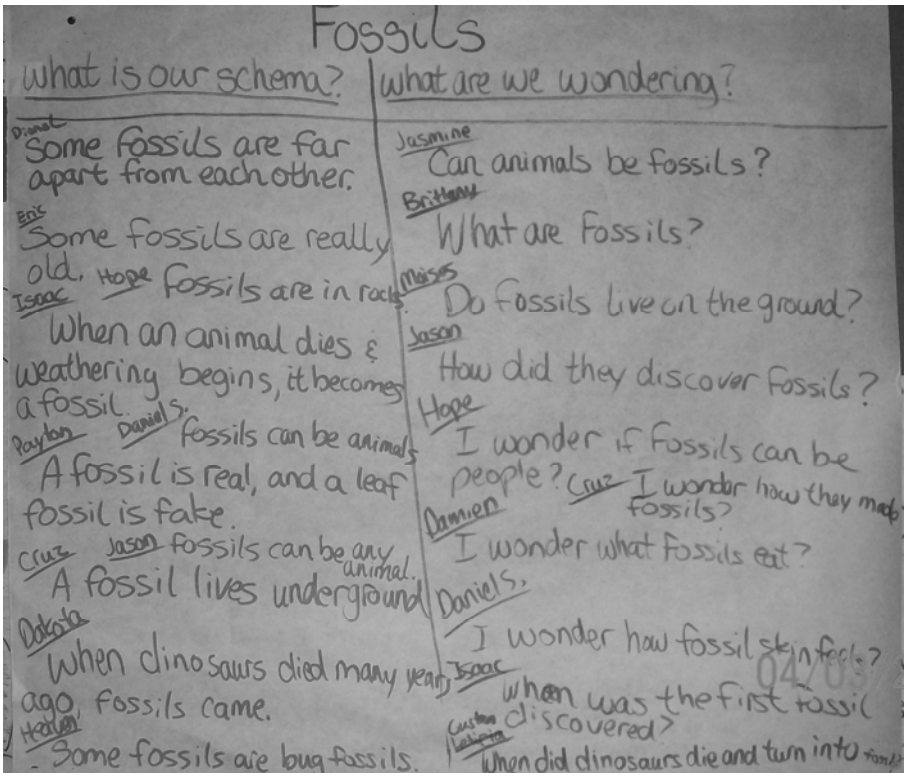
Cognitive Dictionary

word	Predictions:	our ideas of the meaning	final meaning:
weathering	Dakota • wind, rain, and hail Hope • all different weather put together. Diana • I think weathering is erosion. Brittany • Something to do about the weather Isaac • when wind and rain comes down and makes the land move. Maisie • Spring, Summer, fall, and winter	• wears stuff down • Weathering means that the wind blows really hard and the rocks wear down and get softer. You can break them easily. • Rocks break down when exposed to the weather.	When land and rocks are broken into small pieces because of rain, wind, hail, snow, and the hot sun. This process takes many, many, years.

Sentence: Weathering can break peices of land and rocks.

Picture:

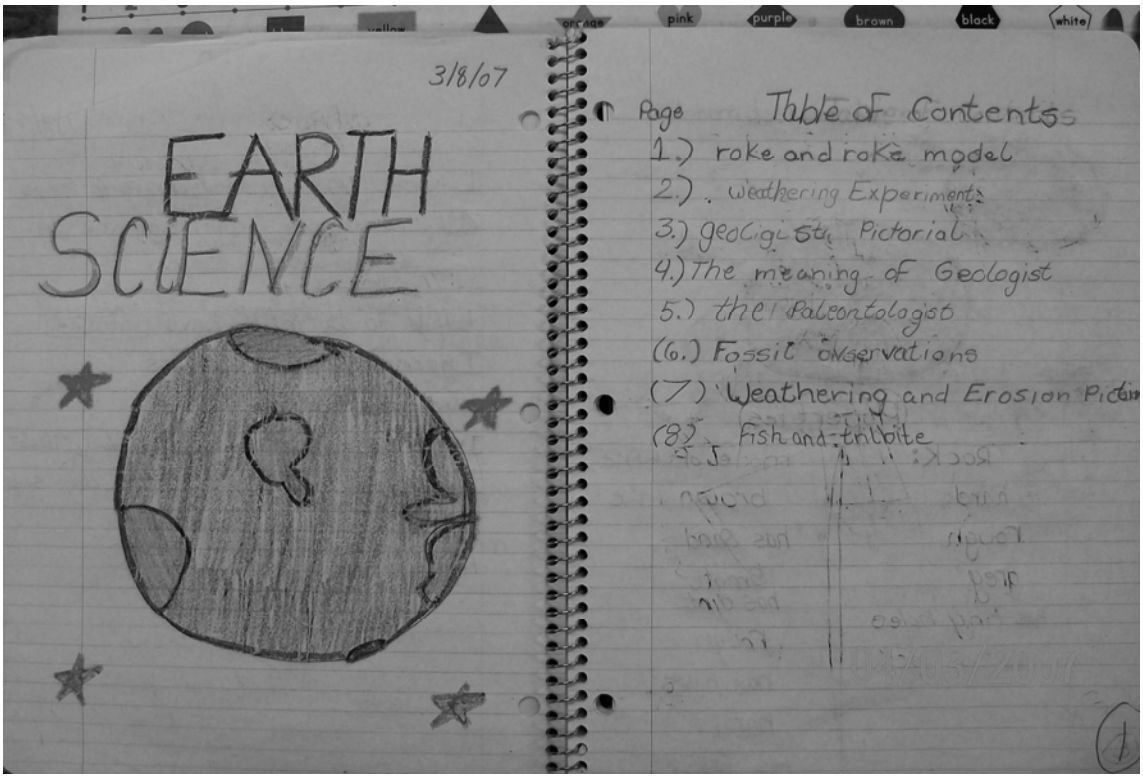
Know- want to know chart (part of KWL)

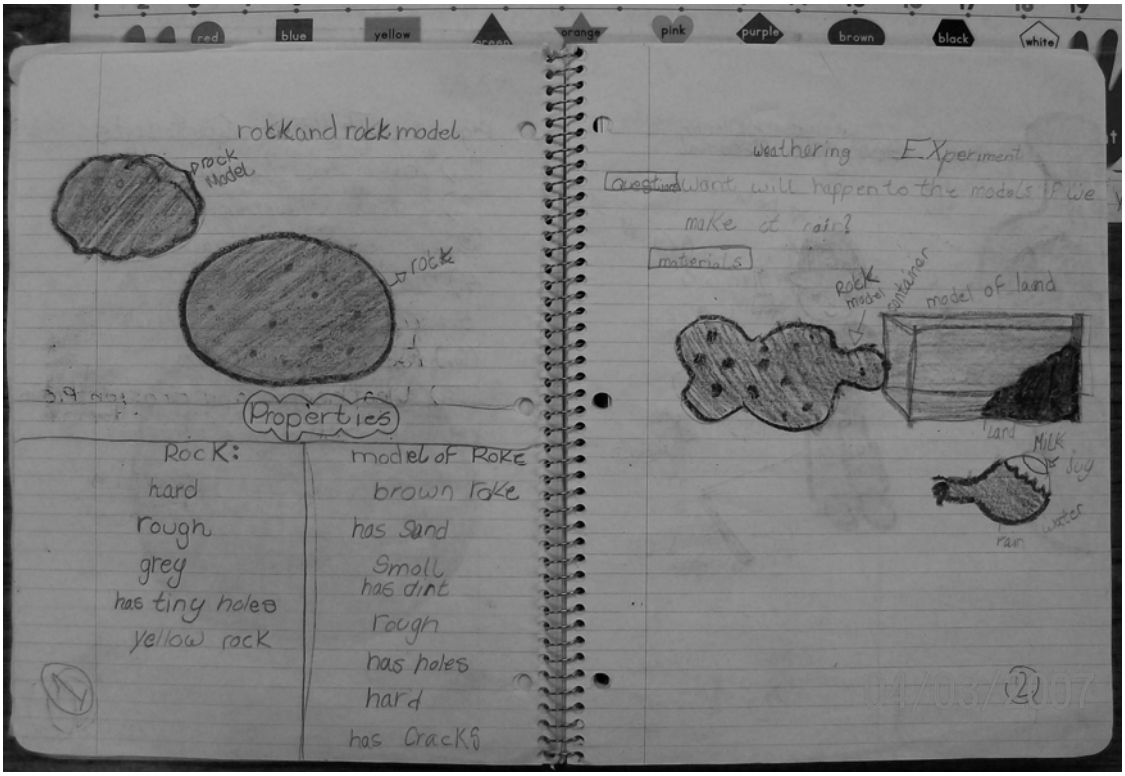


Fossils

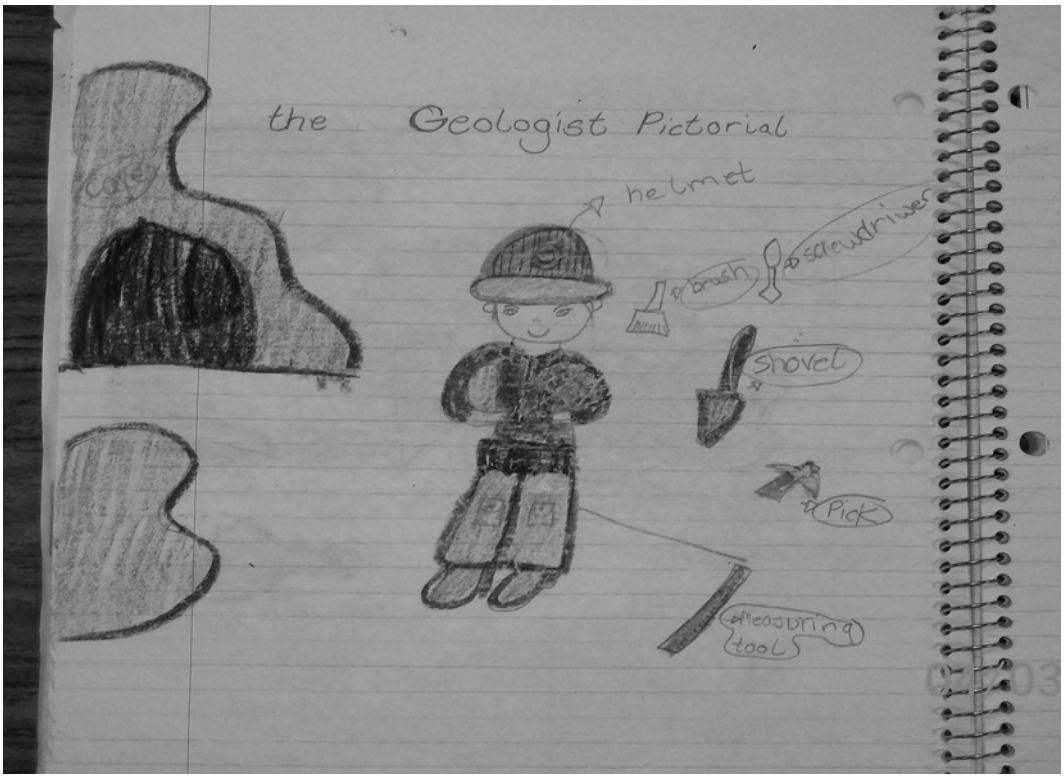
what is our schema?	what are we wondering?
Diana Some fossils are far apart from each other. Eric Some fossils are really old. Hope Fossils are in rock. Isaac When an animal dies & weathering begins, it becomes a fossil. Payton Daniel S. fossils can be animals A fossil is real, and a leaf fossil is fake. Cruz Jason fossils can be any animal. A fossil lives underground Dakota When dinosaurs died many years ago, fossils came. Hayden Some fossils are bug fossils.	Jasmine Can animals be fossils? Brittany What are fossils? Maisie Do fossils live on the ground? Jason How did they discover fossils? Hope I wonder if fossils can be people? Cruz I wonder how they mad fossils? Damien I wonder what fossils eat? Daniel S. I wonder how fossil skin feels? Isaac When was the first fossil discovered? Custom Peloton When did dinosaurs die and turn into

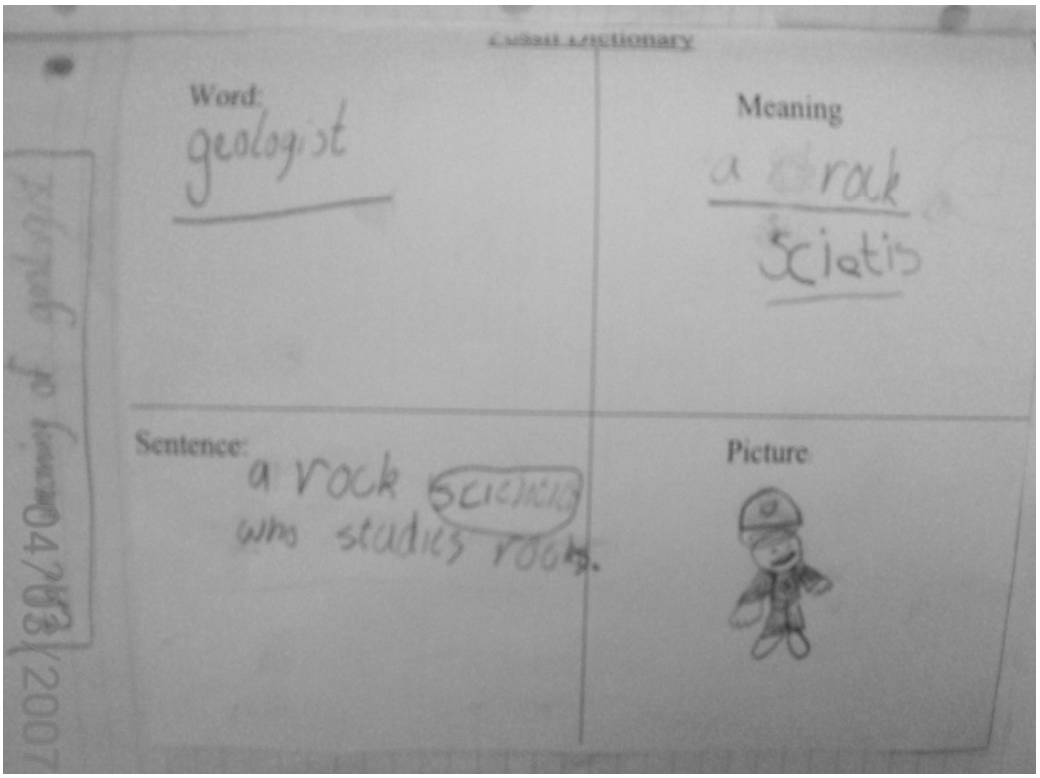
Sample of student learning log pages:



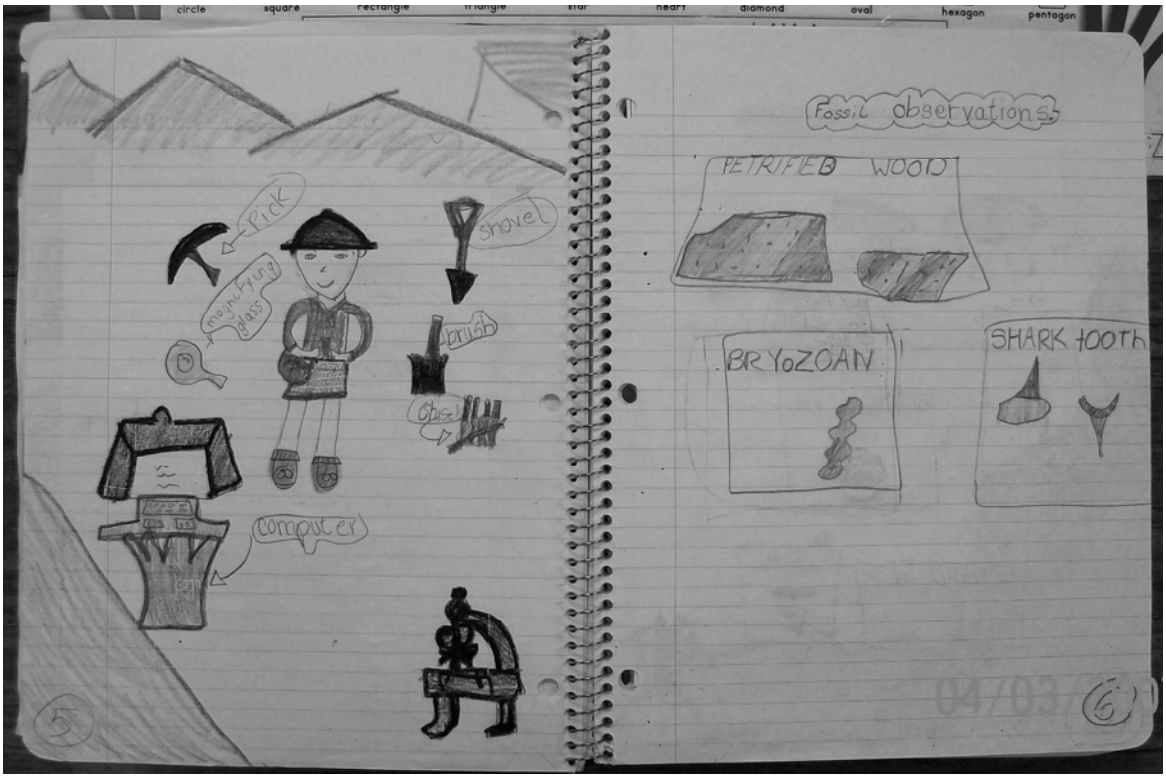


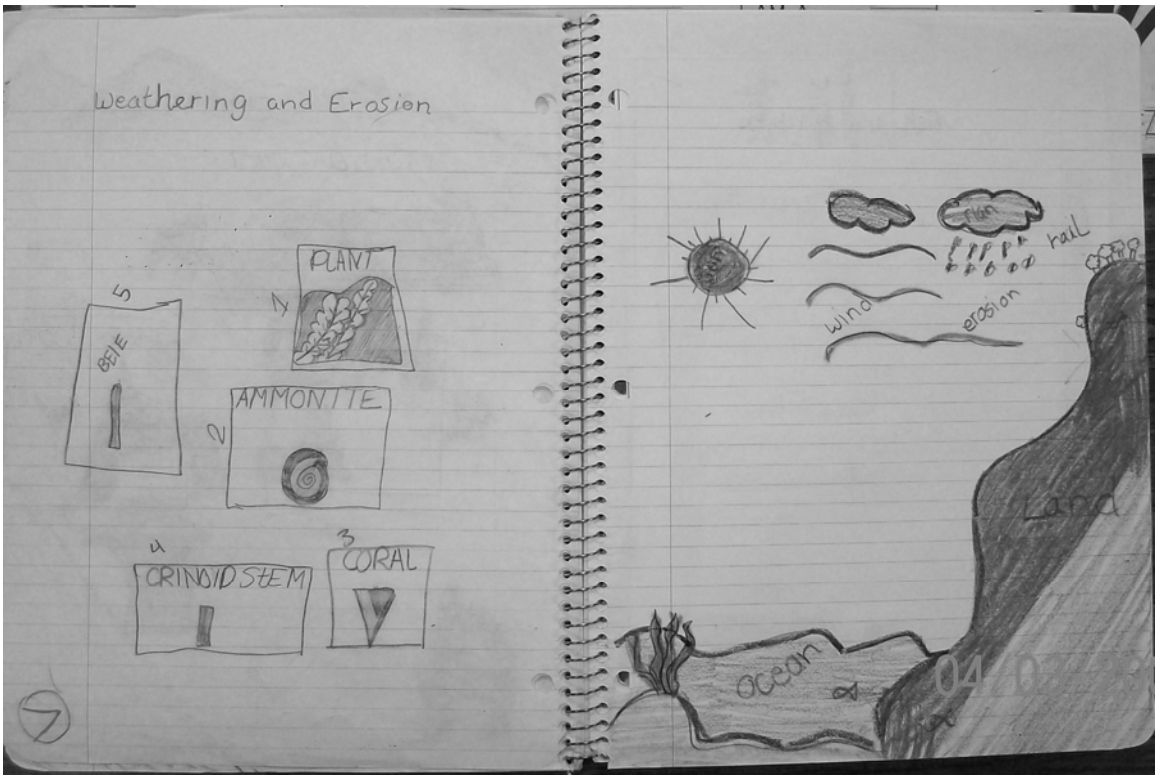
Sample student learning log pages (cont.)



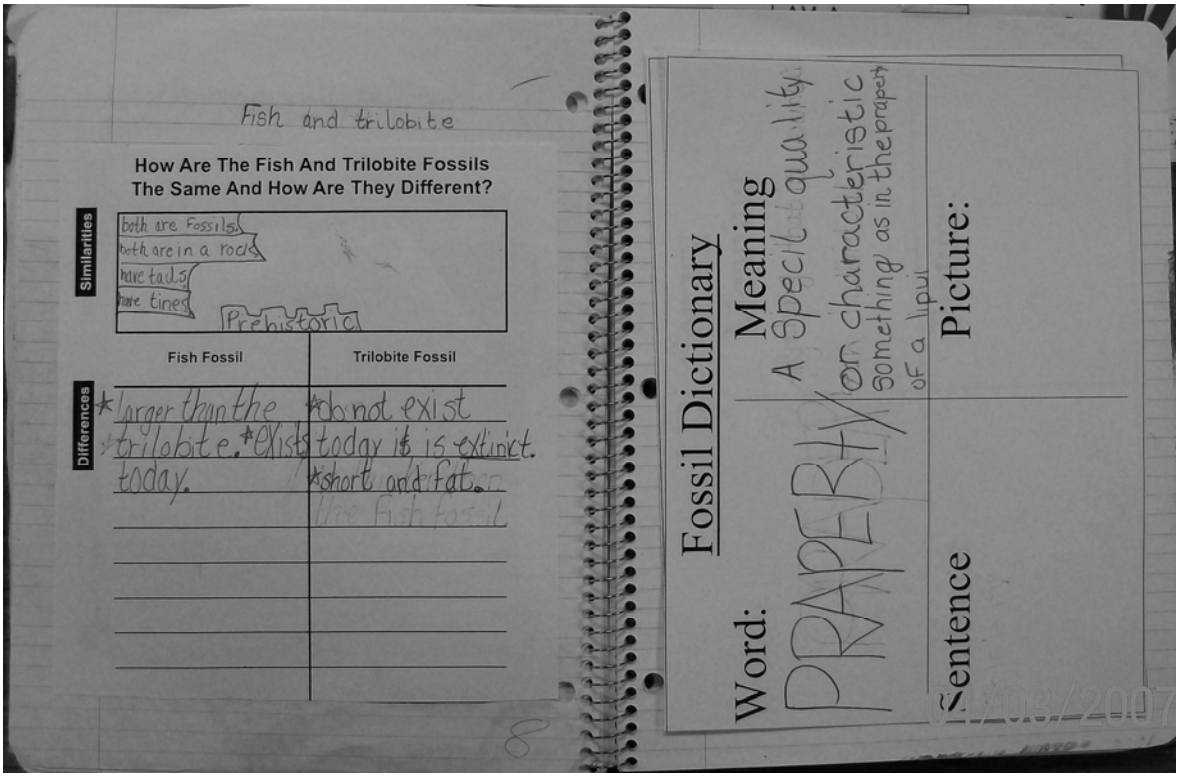


Sample student learning log pages (cont.)





Sample student learning log pages (cont.)



Fish and trilobite

How Are The Fish And Trilobite Fossils The Same And How Are They Different?

Similarities

both are fossils
both are in a rock
have tails
have tines
Prehistorical

Differences	Fish Fossil	Trilobite Fossil
	*larger than the trilobite. *Exists today.	*do not exist today it is extinct. *short and fat. The fish fossil

Fossil Dictionary

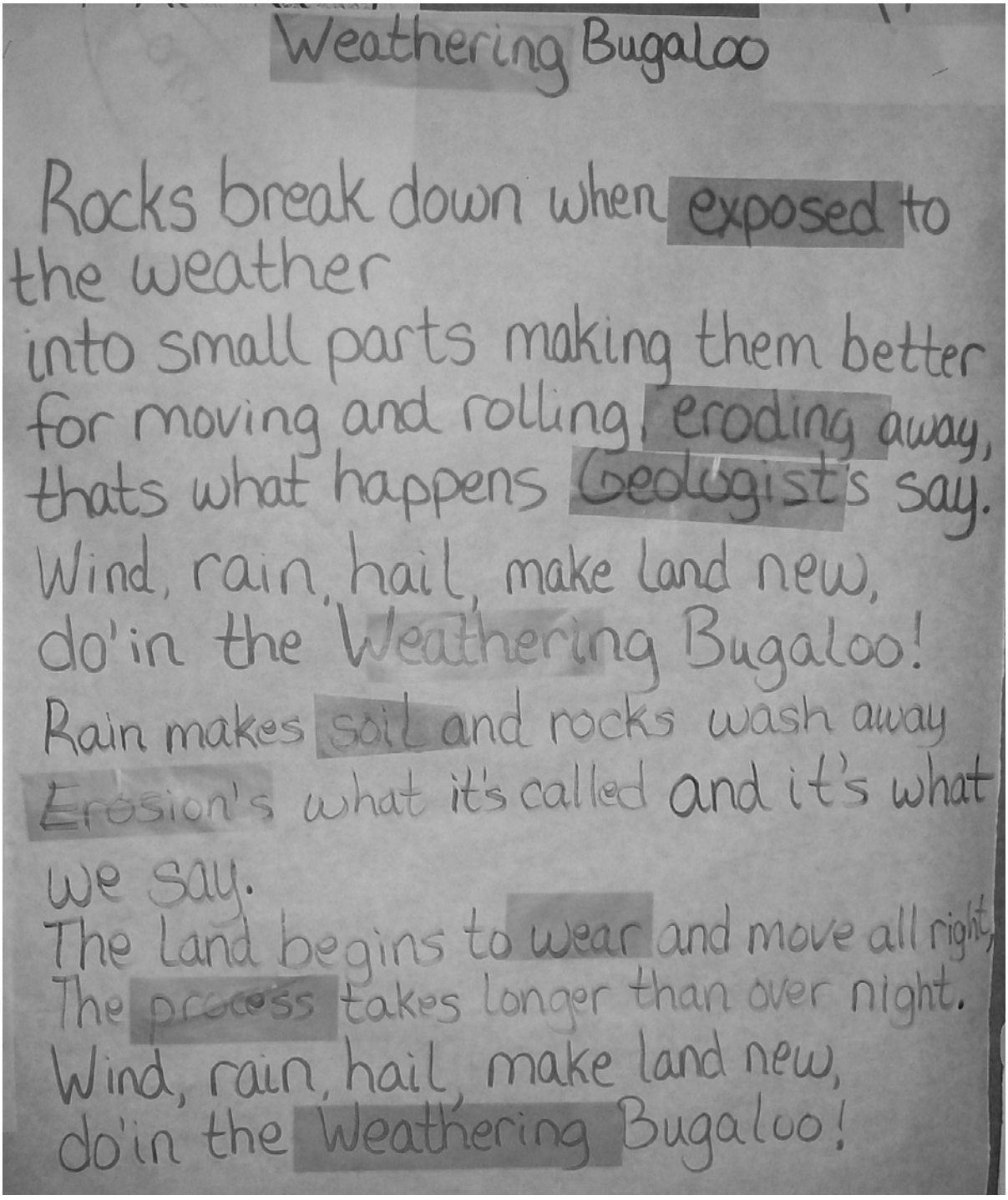
Word: PROPERTY

Meaning: A special quality. Or characteristic something as in the property of a liquid

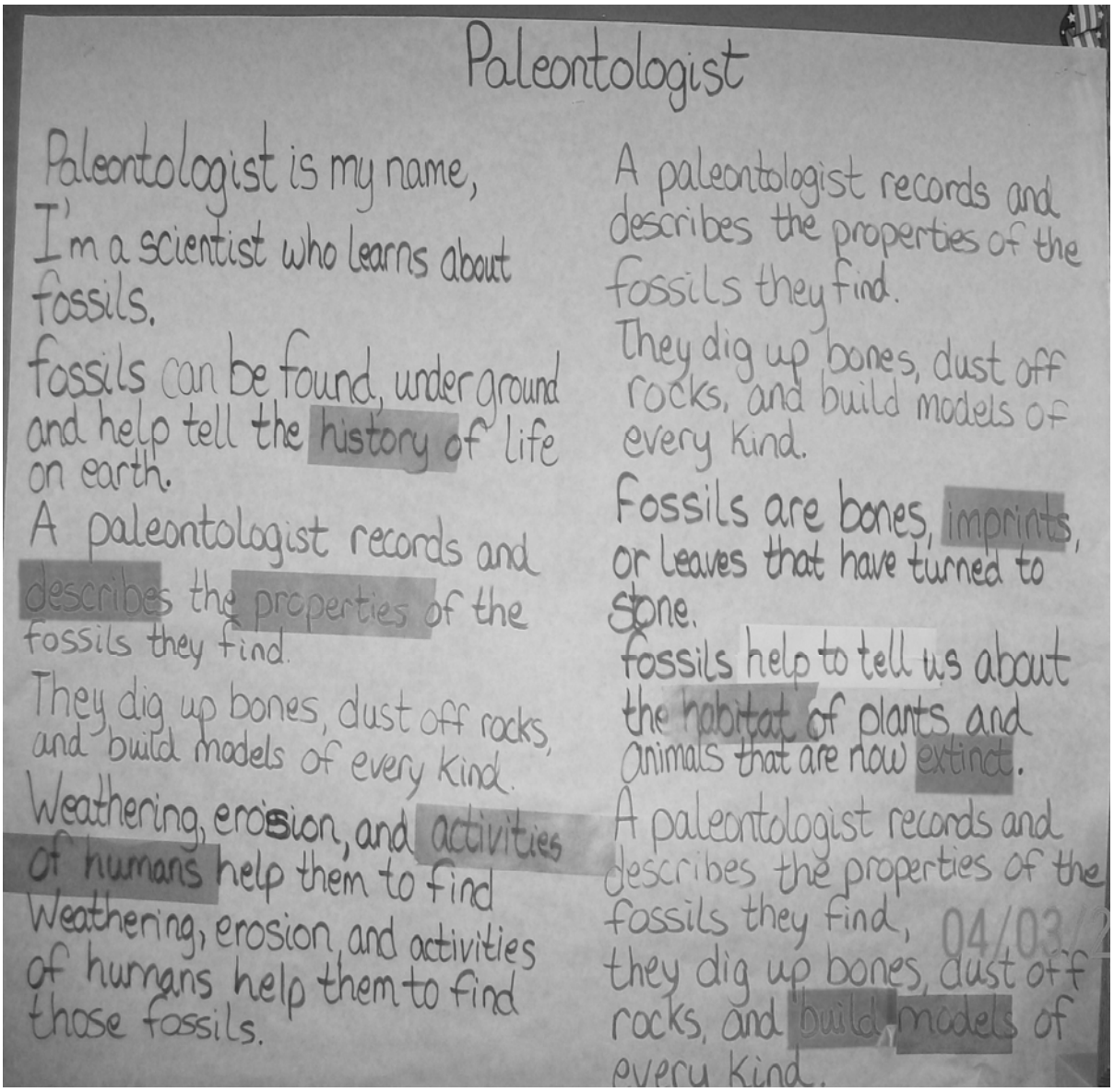
Sentence

Picture:

Weathering Chant



Paleontologist song



Paleontologist

Paleontologist is my name,
I'm a scientist who learns about fossils.
fossils can be found, underground and help tell the history of life on earth.
A paleontologist records and describes the properties of the fossils they find.
They dig up bones, dust off rocks, and build models of every kind.
Weathering, erosion, and activities of humans help them to find
Weathering, erosion, and activities of humans help them to find those fossils.

A paleontologist records and describes the properties of the fossils they find.
They dig up bones, dust off rocks, and build models of every kind.
Fossils are bones, imprints, or leaves that have turned to stone.
fossils help to tell us about the habitat of plants and animals that are now extinct.
A paleontologist records and describes the properties of the fossils they find, 04/03/
they dig up bones, dust off rocks, and build models of every kind.

K-8 Bilingual Program Model

Grade	Time 1st-2nd 3rd trimester trimester	Spanish Instruction	Time 1st-2nd 3rd trimester trimester	English Instruction
K	80% → 80%	Balanced Literacy (2 hours) Mathematics Science Social Studies	20% → 20%	English Language Development (15minutes) Specials
1st	80% → 70%	Balanced Literacy (2 hours) Mathematics (1 hour) Science Social Studies	20% → 30%	English Language Development (30minutes) Specials Class Routines
2nd	70% → 60%	Balanced Literacy (2 hours) Mathematics (1 hour) Science, Social Studies (1 hour)	30% → 40%	English Language Development integrated with Science, Social Studies (1 hour --1.5 hour) Specials
3rd	60% → 50%	Balanced Literacy (2 hours) Mathematics (1 hour- ½ hour)	40% → 50%	Balanced Literacy (1 hour) English Language Development SET Science SET Social Studies SET Mathematics (1 hour) Specials
4th	40% → 40%	Balanced Literacy (2 hours) Mathematics (30 minutes)	60% → 60%	Balanced Literacy (1.5 hours) English Language Development / transition Curriculum / Social Studies Mainstream Science (SET modified) SET Mathematics (1 hour) Specials

5th	30% → 30%	Balanced Literacy (1.5 hours)	70% → 70%	Balanced Literacy (2.5 hours) English Language Development / Set Social studies Mainstream Science, Mathematics (SET modified) Specials
6th –8th	20% → 20%	Balanced Literacy (1 period)	80% → 80%	Balance literacy (1 period) SET or Mainstream Social Studies, Mathematics Mainstream science, Electives

This lesson can be a stand - alone or can be taught in conjunction with the PNNL/ LSTPD Fossil Unit.

Modeling rain on land (weathering & erosion)

*(To use with the PNNL /LSTPD Fossil Unit; adapted from STC **Land and Water** Kit lesson 3 ~ and ~ Janice VanCleave's 201 Awesome, Magical, Bizarre, & Incredible Experiments; "Breakdown" pg 75)*

Adapted by Sarah Moddrell

Second grade GLE's--- **1.3.4, 2.1.2, 2.1.3 2.1.4, 2.1.5**

Lesson overview:

Students will learn that models represent real objects and events and will record the differences between the model and the actual object. They will also draw and label their own examples of the model used in the investigations. **(2.1.4**). Students will learn the meaning and experience the weathering and erosion processes through investigations with a model of a rock and a model of land **(1.3.4**). Students will construct reasonable explanations of investigations using evidence from their investigation **(2.1.3).** Students will see the planning and carrying out of a simple investigation. **(2.1.2**) Students will record results from investigations using drawings and simple sentences. **(2.1.5).** These activities lead into the instruction of GLE's 1.3.5, 1.3.9 knowing about fossils.

Materials

For Land Model:

- Clear plastic box (approx size; 16x11x 6 inch) with a drain hole and something to plug it with
- The plastic box lid with one of the shorter ends cut, so that water could drain out down a slope.
- 1500 ml of all purpose sand
- 500ml, humus
- 500ml gravel
- 250ml clay (powder)
- A flower watering can (with sprinkler like spout)
- Paper towels to clean up spills
- A wooden or plastic spatula

For dirt ball (model of a rock):

- 3 table spoons of the mixture from the land model slightly moistened
- Small glass bowl
- Plastic spoon
- White school glue

*(**Teachers may want more of these materials to make more models for students this amount only makes one)*

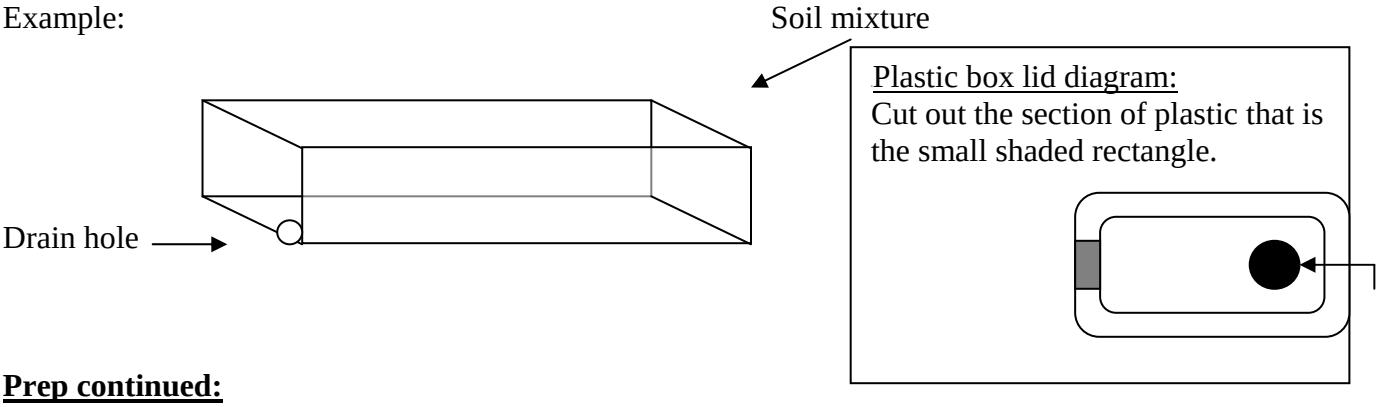
Other:

- A few medium sized rocks that are not very smooth (a size that would fit in a child's hand)
- A bucket or tub to catch water
- 2 pieces of chart paper with a box and T-Chart drawn to compare rock and rock model, and the land and land model.
- Real pictures of land (hills, flats, mesa etc.) *These are optional, but could be useful.*
- 4 clear plastic cups with a sample of the different soil types in each *(teachers may want more sets for small groups to share during observation time)*
- Student science notebooks or teacher provided paper
- Hand lenses *(optional)*

Preparations:

- *Three days before*: **Make the land model**: Pour 1500ml of all-purpose sand into the clear plastic box. Add a little water to moisten the sand (this makes the materials stick together better). Add the humus, gravel, and clay to the sand and stir together. Scoop out 3 tablespoons of the mixture for the dirt ball into a small glass bowl (set aside). "Bulldoze" the mixture off to the end of the container that does not have the drain hole. Making the highest end towards the 11-inch side sloping down to the lowest end measuring about two inches high towards the middle of the container. Set aside to let harden.

Example:



Prep continued:

- *Three days Before*: **Make the dirt ball (rock model)**. With the soil mixture previously set aside, stir in enough glue to make a stiff mixture. Shape the mixture into a ball. Set aside and let them harden for three days. *(you may want to make more than one balls)*
- *Day of:* Fill the watering can with water.
- Make the Box and T-charts.
- Scoop a sample of each soil type into a clear plastic cup. Label the cups with the name of the soil type.

Procedures:

1. Tell students that they will be using a model of land and rocks to learn more about one of the ways fossils are discovered. Introduce the words weathering and erosion. (***weathering*** *is the process by which rocks break down into various earth materials.* ***Erosion*** *is the wearing away and movement of these weathered materials.)"The water that flows over the surface of the earth contributes to weathering and erosion."(Land and Water pg 29)*
2. **Weathering**: Use a cognitive dictionary (GLAD): Allow students time to discuss their predictions with a partner before taking predictions from the class to write in the prediction column. Write 3 or 4 of the students' predictions.

Cognitive Dictionary		
Word	Prediction	Meaning
weathering	(student predictions)	(class negotiated meaning)

3. **Observing and comparing properties of rock models and real rocks (1.1.1, 2.1.4, 2.1.5)**:

   - Bring out the dirt balls and explain to students that these are models of rocks. Let students pass them around and observe what the rocks (models) are made of. Students identify physical properties: hard, bumpy, rough, color etc. Teacher records student ideas on box and T chart (class size).
   - Teacher explains the soil components (gravel, sand, humus, and clay) used in this model and shows the plastic cups with the soil components so students can observe each one closely. Teacher explains that not all rocks are made up of these same parts.
   - Give students time to observe the real rocks and discuss and describe the properties. Teacher records student ideas on box an T-chart
   - Have students discuss the similarities and differences of the rock models (dirt balls) compared to the real rocks. Teacher records the similarities in the box of the box and T-chart.
   - Using the models and information from the class Box and T-chart, Students draw and label the model and rock in their science notebooks (or teacher provided paper) listing a few properties of each. Have students write a brief reflection of the similarities and differences.

THIS COULD BE A STOPPING POINT IF NEEDED

4. **Investigation: Show *weathering* on the model of the rock: (1.3.4, 2.1.2, 2.1.3, 2.1.4, 2.1.5)** Explain to students that you are going to use the model of a rock to demonstrate how weathering of a rock happens over time. Tell students that this

model will show weathering faster than how weathering really occurs. (*you will demonstrate this later)*

- Ask students to recall what the rock model is made of. *(four different soil parts, humus, clay, gravel, sand*)
- Tell students that you are going to simulate rain by pouring water over the model of the rock. Teacher may want to show students what the water will look like coming out of the watering can before demonstrating over the rock to discuss how it looks like rain.
- Students predict what they think will happen to the model of the rock. Teacher records their predictions.
- Then tell students that they are to be watching to see what happens to the rock model as the teacher demonstrates weathering with the watering can.
- Teacher sets the rock onto the plastic container lid and elevates the end so that the rock model is at the top of the slope. *(you may need a student to help hold the model in place)*
- Have another student hold a bucket or tub under the opening cut at he bottom of the lid for the water to drain into.
- Teacher pours water over the rock model simulating rain while students observe. *(pieces of the rock model should start coming off)*
- Teacher repeats the experiment with a real rock and explains why there wasn't an evident change.
- Teacher draws and labels a picture of the weathering model on chart paper, overhead, or white board. Ask students to discuss the functions of the parts of the model. *(the rock model is a rock, the watering can and water is the rain…..)*
- Have students draw and label a picture of the weathering model in their science notebooks or on a separate piece of paper and record their observations of the experiment.
- Teacher models writing an explanation using evidence from the experiment (2.1.3)

5. **Revisit the Cognitive Dictionary** for *weathering*. Ask students to discuss with a partner if one of the predictions matches a meaning of weathering, or if they have a better meaning.

- Give students a few minutes to discuss with each other.
- Bring the class together to decide on a definition as a large group. Try to persuade students to a definition that is close to the one defined previous. Use student wording, as it will be more meaningful to them.

THIS IS A GOOD STOPPING POINT IF NEEDED

6. **Erosion**: Use a cognitive dictionary (GLAD): Allow students time to discuss their predictions with a partner before taking predictions from the class to write in the prediction column. Write 3 or 4 of the students' predictions.

Cognitive Dictionary		
Word	Prediction	Meaning
Erosion	(student predictions)	(class negotiated meaning)

7. **<u>Observing and comparing properties of the land model and real land</u> (1.1.1, 2.1.4, 2.1.5):**

- Bring out the land model and explain to students that this is a model of land. Let students observe what the land model looks like.
- Teacher explains the soil components (gravel, sand, humus, and clay) and shows the plastic cups with the soil components so students can observe each one closely.
- Students identify physical properties of the model; try to identify the soil parts within the model. Teacher records student ideas on the box and T chart (class size).
- *If teacher has pictures of real land*: Give students time to observe the pictures and discuss and describe the properties. Teacher records on box and T-chart.
- *If teacher does not have the pictures,* then the students can discuss what they know about real land and some of the describing properties. Teacher records on box and T-Chart
- Have students discuss the similarities and differences of the land model compared to land. Teacher records the similarities in the box of the box and T-chart.

THIS COULD BE A STOPPING POINT IF NEEDED

8. **<u>Investigation: Show *erosion* on the model of the land</u>: (2.1.2, 2.1.3, 2.1.4, 2.1.5)**
Explain to students that you are going to use the model of land to demonstrate how erosion happens over time. Tell students that this model will show erosion <u>faster</u> than how erosion really occurs. (*like the rock experiment)*

- Ask students to recall what the land model is made of. *(four different soil parts, humus, clay, gravel, sand*)
- Tell students that you are going to simulate rain by pouring water over the land in the model.
- Students predict what they think will happen to the land. Teacher records their predictions.
- Then tell students that they are to be watching to see what happens to the land model as the teacher demonstrates erosion with the watering can.
- Teacher pours the water over the land simulating rain.

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- Teacher draws and labels a picture of the erosion model on chart paper, overhead, or white board. Ask students to discuss the functions of the parts of the model. *(the soil is land, the watering can and water is the rain…..)*
- Have students draw and label a picture of the erosion model in their science notebooks or on a separate piece of paper and record their observations of the experiment.
- Teacher models writing an explanation using evidence from the experiment (2.1.3)

9. **Revisit the Cognitive Dictionary** for *erosion*. Ask students to discuss with a partner if one of the predictions matches a meaning of erosion, or if they have a better meaning.
    - Give students a few minutes to discuss with each other.
    - Bring the class together to decide on a definition as a large group. Try to persuade students to a definition that is close to the one defined previous. Use student wording, as it will be more meaningful to them.

Clean up of land model: *(if you are using this lesson with the Fossil Unit save the land model)*

1. Drain the water out of the model through the hole in the bottom of the plastic container.
2. Find something to bury about a half an inch below the surface of the land (*for discovery after erosion later)*
3. Reshape the land part of the model to look like how it did before the experiment.
4. Set aside to dry.
5. After the power point lesson in the fossils unit (lesson 2), use the model for a quick demonstration of how erosion helps fossils to be discovered. Pour water over the model to reveal the object you buried under the surface.

Resources

Land and Water. (2004). (2nd ed.), *Science and Technology for Children*. Burlington, NC: Carolina Biological Supply Company.

VanCleave, J.P. (1999). *Janice vancleave's 201 awesome, magical, bizarre, & incredible experiments*. New York, NY: John Wiley & Sons.