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Abstract:
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Rocking your Writing Program: Integration of Visual Art, Language Arts, & Science

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Abstract

This paper explores the integration of art, literacy and science in a second grade classroom, showing how an integrative approach has a positive and lasting influence on student achievement in art, literacy, and science. Ways in which art, science, language arts, and cognition intersect are reviewed. Sample artifacts are presented along with their analysis to show how students learn in an integrated unit that incorporates visual art as a key component. While we recognize the importance of art as a unique domain, this research demonstrates how integration of visual art, literacy, and science content creates an effective curriculum benefiting all students.

> It is the business of the artist and of the man of letters to reproduce and fix forms of imagination to which the mind will afterwards recur with pleasure; so, based upon the same great principle by the same instinct, if I may so call it, it is the business of the man of science to symbolize, and fix, and represent to our mind in some easily recallable shape, the order, and the symmetry, and the beauty that prevail throughout Nature … the great truth that art and literature and science are one, and that the foundation of every sound education and preparation for active life in which a special education is necessary should be some efficient training in all three. (T.H. Huxley, 1887)

This article explores the integration of art, science and literacy in a second grade classroom. While not a new phenomenon, national and state pressures through standards and high-stakes assessments have fractured the elementary curriculum, moving it away from the idea of integrated cohesive curricular units. At the same time, art, science, and social studies are often seen as "nice but not necessary" components of the primary curriculum to be addressed later after students have mastered the *Three R's* (reading, writing and ‘rithmetic).

Research in science education has shown that the mastery of foundational concepts in science in the elementary years predicts interest, as well as success, in high school science. Currently, we are presented with the "fourth grade slump" in which the percentage of students at grade level in reading slides significantly around fourth grade. This is most probably a result of shifting assessment demands to domain specific knowledge. Research has shown that students from at-risk backgrounds who focus on a narrow set of skills may be especially susceptible to such a slump (Juel, 2006). At the same time, national and international studies (NAEP, PISA, and TIMSS) show that US students are falling further behind in science. In the years from second through fourth grade, there is a shifting of assessment demands from skills to domain specific knowledge. This challenge leads us to contend that the goal of the primary years is to create a solid foundation for later learning that must include a broad curriculum that is integrated in a way to support learning across multiple domains. Such an approach, when implemented well, has the potential of mitigating some of the underlying causes of later school failure. Research and teacher practice have shown repeatedly that quality integration can actually be effective and efficient in reaching multiple educational standards (e.g. Drake, 2001).

In this article, we first review the ways in which art, science, and language arts intersect and then present sample artifacts and their analysis to show how students learn in an integrated unit that incorporates visual art as a key component.

Literature Review

Arts Integration

Arts integration as a way to enhance both teaching and learning is important in the context of elementary classrooms in schools that do not employ specialists in the arts. It has become the responsibility of the generalist teacher to teach the standards in the arts as well as all of the other content areas. While some teachers and administrators regard the subjects that are “tested” as most important, both students and teachers can benefit from integration of the arts

into other core subjects, such as literacy, science and social studies. Learning in the arts, learning through the arts, and learning integrated with the arts are both time efficient, motivational and simply make academic sense. Benefits range from increased academic success to fostering creativity (Appel, 2006). Dewey (1938) and Gardner (1993) have both argued that using an integrated or enriched curriculum provides multiple access points and ways for students to connect to learning (Winner & Cooper, 2000; Winner & Hetland, 2000). Strengths or preferences of individual learners can be used to their advantage. Those strengths can be thought of by teachers as starting points for lessons, building blocks for further understanding, as bridges between old and new (known and unknown) information or as an alternate (additional) way to demonstrate understanding.

Davis (1999) presented eight ways that arts are included in schools as Arts-Based, Arts-Injected (or infused), Arts-Included, Arts-Expansion, Arts-Extra, Aesthetic Education Model, and Arts-Cultura. Similarly, Goldberg (1997) described the "arts as integrated in learning in three ways: "Learning about the arts, learning with the arts, and learning through the arts." She feels that the arts are a methodology for teaching that "provides the teacher with an expanded repertoire of actions and activities to introduce subject matter" (1997, p. 4-5). That repertoire may include the study of texture, pattern and repetition, not only in works of art, but in nature, music, and literature.

Integration is a broad term that has many different "looks" and "names," depending on who is presenting the information and how finely the hairs are split. Integration looks for authentic connections between content areas and the instruction advances learning in the content areas being integrated. Generalist teachers continually make decisions based on time, experience and expectations about what to incorporate or integrate into their daily schedules. Susannah Brown describes arts integration as "a weaving wherein the design may repeat a pattern or be variable. Just as the warp and weft strings are an integral part of a woven whole, the arts are an integral part of the curriculum and are valuable in all aspects of teaching and learning" (Brown, 2007, p. 172) . It is this sort of arts integration that we have chosen to study.

Arts and Language Arts

Vygotsky (1978) stated that make-believe play, drawing, and writing are part of the process of developing oral and written communication. He described development as a process of increasing abstract representation, distancing the object from the symbol ultimately leading to higher order thinking. From a Vygotskian perspective, the integration of visual art in school can be seen as a bridge from non-verbal to linguistic expression. Visual representations support the development of higher order cognitive functions that are required for literacy development. The role of visual representations is to create a semiotic connection between artistic and linguistic signs. While Vygotsky himself seemed to undervalue early artistic expression as valuable beyond its role in linguistic development, we contend that current research shows that artistic expression serves as more than a springboard for language.

Following Vygotsky's rationale, Dyson (1986), who studied composing events in young writers noticed that they used images and words interchangeably as an intertwined symbol system, and found that children using this intertwined symbol system were consistently able to create more complex and coherent writing. Drawing often provides a medium for young children

or non-English speaking children to communicate more complex ideas (Gardner, 1980). Gundlach (1982) saw children using "the mixed medium" approach to convey meaning. Children would use writing initially to label their drawings or use the drawings to clarify their writing.

A number of studies found that all students, including English language learners, became more fluent and cohesive writers when using image creation as a pre-writing strategy (Andrzejczak, Trainin, & Poldberg, 2005; Trainin, Andrzejczak, & Poldberg, 2005). Further, the research showed that vocabulary improves as students seek to put into words the ideas they first expressed in art. In fact this connection between drawings and concepts is particularly helpful in acquiring scientific academic language.

Linking image, language, and domain knowledge (in this case science) is especially critical as we reach out to a diverse student population, especially English language learners. Many students who are striving to succeed academically benefit from a non-text entry point into the curriculum. Non-linguistic representation has been found to assist English language learners in expressing their ideas (Marzano, Pickering & Pollack, 2001; Hill & Flynn, 2006). The use of art, identified by Krashen and Terrell (1983) as an important strategy in meeting the needs of English language learners, lowers the affective filter and engages students throughout the learning process. We believe art images directly related to science curriculum and domain vocabulary have the potential to make powerful connections that are meaningful for English learners.

Art, Motivation and Cognition

The connections between arts and literacy are a combination of emotional, cognitive and creative paths. Several researchers (Catterall, Chapleau, & Iwanga, 1999; Deasey, 2002; Hetland & Winner, 2001; Winner & Cooper, 2000; Winner & Hetland, 2000) claim that the arts provide a heightened level of engagement that generalizes to an improved attitude toward school affecting behavior and achievement. Greene (1995) posited that incorporating arts into the curriculum leads to a "deepening and expanding mode of tuning-in" (p. 104). When students are able to "tune in," they are able to make personal connections to learning and the curriculum.

Going beyond emotion and motivation, Efland and Eisner, each in his unique way, have claimed that the importance of the arts in education is more than a developmental bridge or a motivational tool. They claim, in fact, that artistic ways of thinking extend cognition and represent higher-order thinking. Both see art as a way for children to make sense of their world and process abstract ideas. Efland feels that art is a way to internalize concepts, process information, visualize and develop the ability to think metaphorically. "Metaphor, in particular, constructs linkages that enable us to understand and structure one domain of knowledge in terms of knowledge in a different domain, thus it establishes connections among seemingly unrelated things" (Efland, 2004, p. 770). "As used in the arts, metaphor creates a space in human cognition where individuals are free to rehearse new ideas of expression and form" (Efland, 2004, p. 757). Eisner contends that "Many of the most complex and subtle forms of thinking take place when students have an opportunity to work meaningfully on the creation of images . . . or to scrutinize them appreciatively" (Eisner, 2002, xi-xii). "The arts, as vehicles through which . . . inscription occur, enable us to inspect more carefully our own ideas . . . The works we create speak back to us, and we become in their presence a part of a conversation that enables us to 'see what we have

said'" (Eisner, 2002, p. 11). Eisner uses an example of watercolor painting and its complex demands to describe cognition. "What occurs as individuals become increasingly competent in watercolor painting is the development of intelligence in that domain. This development requires the ability to deal effectively with multiple demands simultaneously. And it is in learning to engage in that process that perception is refined, imagination stimulated, judgment fostered, and technical skills developed" (Eisner, p. 15). Efland added, "If the purpose of education is to enhance cognitive capabilities of individuals it must offer experiences within domains calling for an array of abilities, and differing domains having differing structure required differing approaches in instruction" (Efland, 2004, p. 756). Arts integration in the elementary school should be viewed as a way to strengthen all integrated disciplines for the benefit of the learner.

Art and Science

The connection between art, writing, and science is in some ways natural and often productive (Hudson, 2000). The processes of observation, recording, and creative problem-solving are threads that connect the three domains. Many scientists and artists find meaningful connections between art and science. In the 17th through 19th Centuries, naturalists routinely were artists observing and recording nature. Examples of these artist/scientists are Maria Sibylla Merian, James Audubon, and others. Root-Bernstein (2000) pointed out some examples of artists having an impact on scientific thinking. For example, pointillist painters such as Seraut invented the process of breaking apart a picture into discrete areas of color (pixels) that is used in technology (e.g. computer screens). This concept of individual color dots that blend to make a whole image was revolutionary in the late 1800s and now is commonplace for school children today. Currently scientists use the technique of false-coloring to emphasize elements of data, the concept invented by Fauvist painters in the early 1900s. Artists often invent new structures that scientists then discover in nature, such as Buckminster Fuller's geodesic structures. Conversely, artists employ scientific principles in their use of color and light theory in photography and digital media, as well as principles of chemistry in ceramics. The overlap is also recognized in the recently released Next Generation Science Standards (Achieve, 2013). The Next Generation Science Standards identified crosscutting concepts as ideas that guide the overall development of scientific reasoning, among them: 1) Patterns and 3) Scale, Proportion, and Quantity. Both crosscutting concepts correspond directly to learning in the arts.

Making such connections between art and science has become increasingly relevant in the 21st century. There is, therefore, reason to believe that children can and should make similar connections between art and science. If scientists use art and artists use science, the connection between the two should be modeled and explored as part of the curriculum. The science skills of observation, recording and creative problem-solving cross domains. By using the study of science, students are provided with real life connections between art and science and authentic purpose. Integration is closely woven within the fields of art, science, and literacy, and this integration can be replicated and studied in the classroom setting. For children, it can start with "thinking", like a scientist/artist, by asking a simple question such as, "What do I see?" Then, as they record what they see, they also replicate the actions of a scientist/artist. Both scientists and artists (and children) explore and experiment as they seek to explain and document the world they see as well as the world they imagine. The connections between art and science are inherently in both domains.

One important aspect of illustrating natural objects is the ability to isolate that object. Photographing the rock in the field can present issues with depicting critical attributes. When children illustrate the object, they can focus on those physical properties and on observation of the main object of inquiry. For many children, this intense one on one experience with a rock is very beneficial in terms of building awareness of the natural world. This is a clear illustration of the Next Generation Science Standards identified in the crosscutting concepts section, "Patterns." "Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them." Appendix G p. 1 (Achieve, 2013)

The Study

In this article, we explore how the integration of art and science stimulates scientific thinking and artistic development, while supporting growth in domain specific literacy in a second grade classroom. It is a pilot study focusing on one classroom as a model of how we can integrate art and science in contemporary classrooms.

A New VIEW on Science was a project designed to assist general elementary teachers in providing arts-infused active science and literacy experiences for second grade students at Hillside Elementary School. Hillside Elementary School, located in southern California, is a K-5 school that has approximately 31.7% English Language Learners (ELLs) and 67% students who qualify for free or reduced lunches, located in an area designated as urban fringe. The project work began with two teachers, one project staff person and the education staff of the San Diego Natural History Museum, collaborating on program design during the summer. During the subsequent district pre-service days, all volunteer project teachers (six total) collaborated to form the specific unit design for the earth science unit, *Rocks Tell a Story*, and the life science unit, *Living Things Grow and Change*. The teachers devoted one entire day to planning for specific implementation of the first unit, *Rocks Tell a Story,* to be taught in the fall.

Instructional Sequence for *Rocks Tell a Story*

The second grade classes at Hillside Elementary School were introduced to their earth science unit in the fall with a program provided by the San Diego Natural History Museum. Ms. Frizzle (of the famed *Magic School Bus* series™) presented information about the earth in a 45-minute assembly setting to 3 classes. A week later, a museum educator provided each class with a student workshop that consisted of several hands-on activities focusing on the earth science content standard Grade 2. 3. "Earth is made of materials that have distinct properties and provide resources for human activities" (California Department of Education, 2000, p. 6). The classroom teachers participated alongside their students as small group facilitators.

Each classroom teacher then expanded upon the museum activities in his/her individual classrooms, combining district curriculum with additional support materials. Materials included rock samples, non-fiction books at various reading levels and a magnifying glass for each student. The unit included a series of lessons for each type of rock (igneous, sedimentary, metamorphic), as well as lessons on weathering and fossils. The content standards addressed in the Unit's lessons were:

- Visual Art - Use of watercolor and crayon resist media

- Science - Rocks have different properties
- Language Arts – Writing using details in descriptions
- English Language Development - Opportunities to listen, speak, read and write.

Table 1 gives a short schematic of the instructional sequence.

Table 1: Instructional Sequence

Lesson	Instruction	Product
Museum	Ms. Frizzle school visit	Engagement
Introduction (Stimuli)	Connection to previous lessons Exploration of rock samples Non-Fiction books	
Linking	Ms. Frizzle Earth Science books Students receive a rock and a classification card	
Art Creation	Teacher model techniques for creating texture in watercolor. Students create their own	Water color painting of the rock
Oral Rehearsal	Each student presents his/her rock orally	Oral presentation, sticky notes with descriptive words
Organizing Information	Teacher models creating semantic web followed by students	Semantic web (includes words from sticky notes)
Writing	Teacher models creating a "Who am I?" riddle. Students follow teacher model	
Publication	Art and Riddle presented on classroom walls	

One series of lessons within the unit has been selected as an example of the art, literacy and science integration found within the entire *Rocks Tell a Story* unit. The following paragraphs describe the moves of one project teacher, Mrs. Johnson, and her students, within that lesson sequence. We chose to focus on student artifacts of the art and writing processes in Mrs. Johnson's classroom, because it was a high implementation fidelity classroom. We examined artifacts from a purposeful sample of students that represented a range of ability levels and gender. The sample included three boy and girl pairs from low, middle and high academic achievement levels, including three English Language learners. Grade level language arts proficiency skills were identified, and student work was chosen to be a representative sample.

The students were Sandra, an advanced student reading above grade level; Christopher, academically proficient reading at grade level; Luke, an average student, classified as an intermediate level English language learner and reading slightly below grade level; Caroline, an average student reading at grade level; Leo, an academically struggling boy and early intermediate level English language learner, reading below grade level; and finally, Patricia, an academically struggling girl, a beginning English language learner, performing well below grade level in all language arts areas. The student work in Figures 1, 2, and 3 are Christopher's work and shared as a representative sample.

I am smooth and I look like I've been stacked like paper.
I look like a vase.
I am metamorphic.
I am kind of sharp and I was made by heat and pressure.
I was shale at first. It looks like a diamond.
I am gray. It takes millions of years for me to form.
I have a whole bunch of stuff on top of me in the earth.
It has to take water, gas, and fluid.
I am used for sidewalks.
I am sparkly.
What am I?
I am slate.

Figure 1. Student art product and final published riddle

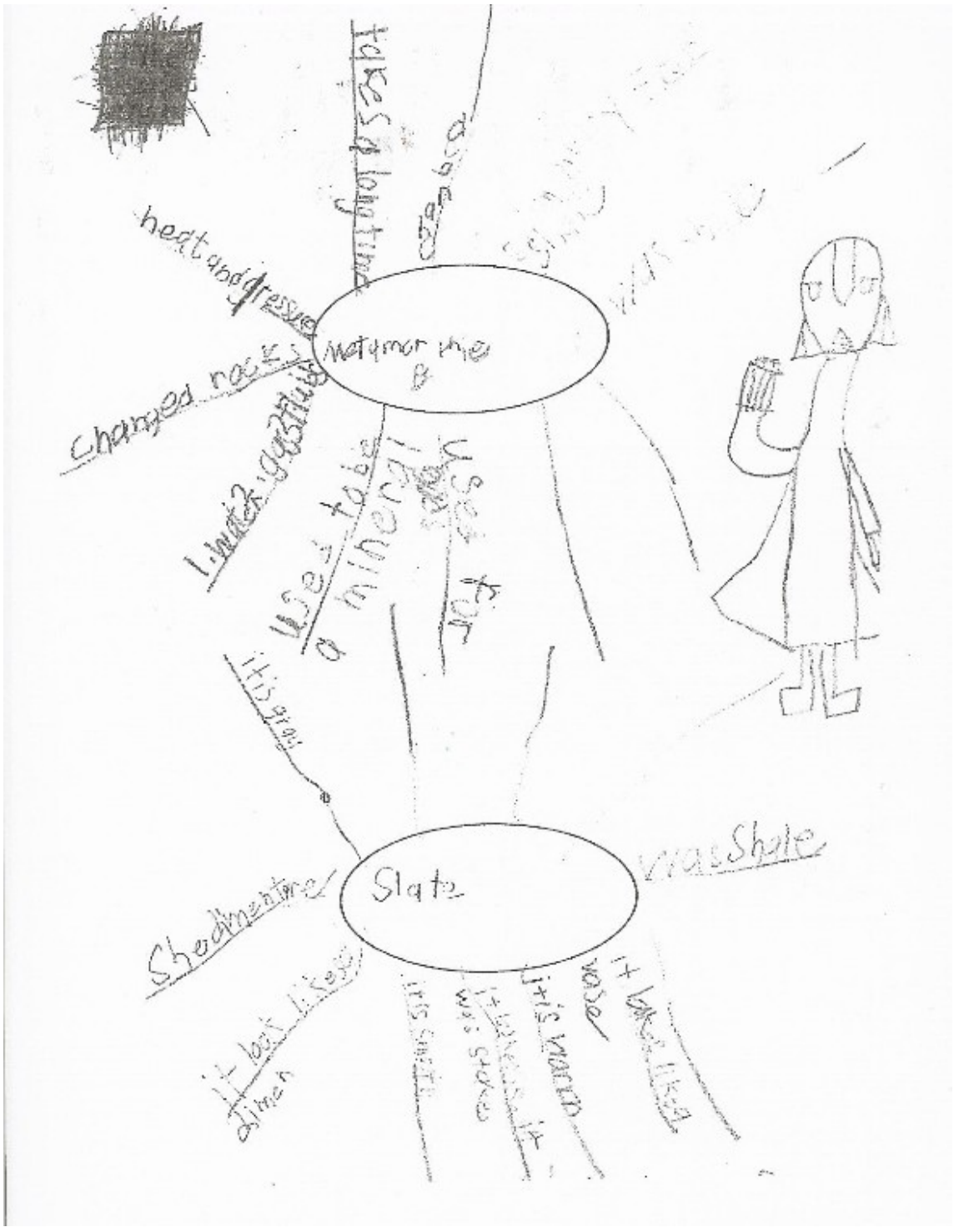

Figure 2. Semantic word webs

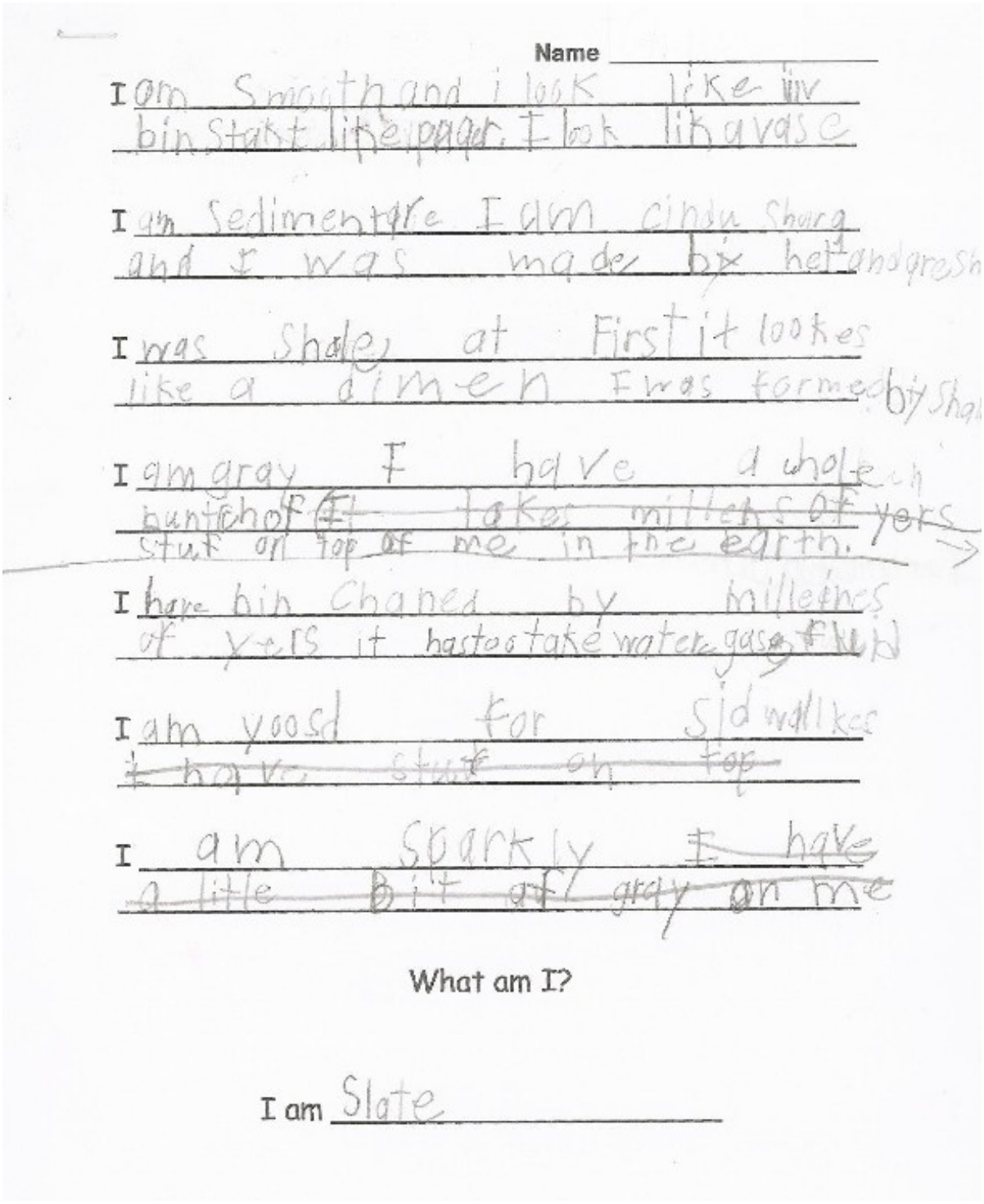

Figure 3. Cloze worksheet and rough draft for riddle

Mrs. Johnson introduced metamorphic rocks. (Sedimentary and igneous rocks were introduced previously.) The students explored over one dozen different samples of metamorphic rocks passed around the room and subsequently displayed on the “rock table.” The primary

sources of factual information were non-fiction books with color photographs and the science curriculum text. Ms. Frizzle books on earth science provided a link between the Unit kick-off activities (Ms. Frizzle assembly and student hands-on museum workshop) and the classroom instruction.

Each child chose a different metamorphic rock to keep at his/her desk. A name card was provided to the student with the correct spelling of the rock name and classification. Mrs. Johnson also had a metamorphic rock that was used in the teacher-modeling phase of each part of the lesson.

Mrs. Johnson modeled creating a painting of her metamorphic rock, using crayon and watercolor media. This was not the first introduction to the media, but an opportunity to practice skills and make choices regarding previously taught techniques to show texture, such as the use of salt to create roughness or a toothpick to show layers. Each child had his or her own set of watercolor paints, a paintbrush and a set of 24 crayons. After Mrs. Johnson modeled painting her metamorphic rock using the crayons and paint, the students went back to their desks, with their rocks, a magnifying glass and art materials to create an artistic representation of their metamorphic rock. Once all artwork was dry, each child told about his or her rock in a "sharing session," including details about color, shape, size and texture. Students were given sticky-notes with the descriptive words they or their classmates shared (recorded by Mrs. Johnson.) These were put into their writing folders as a word bank for later use.

The next day, Mrs. Johnson modeled the use of a semantic word web, including all the information they had learned about metamorphic rocks. In the following lesson, Mrs. Johnson modeled the use of a semantic word web again, to note details about her specific metamorphic rock. Each child was then directed to use the same format to note details about the specific metamorphic rock. They were encouraged to use some of the words from the sticky-notes received during their previous oral sharing.

Finally, Mrs. Johnson modeled using information from the semantic web to create a riddle using a cloze format. The riddle format was chosen for the writing because it was engaging and gave students a sense of audience. Concise clues would engage the hearer to explore his/her knowledge of the rock as well. Writing a riddle involves a higher level of thinking on the students' part, requiring them to understand what the rock *is*, in addition to what it *is not*. Each line began with *I am*. Seven lines were provided, and students were asked to complete a minimum of two questions. They were told that they could add more lines if they wanted. Near the end, *What am I?* was asked and then the "answer" provided on the last line. All rock art and writing were published on the classroom wall, with the artwork mounted on the page along with the final writing.

Results and Discussion

Student art and writing samples from the lessons for the metamorphic rock were examined to draw conclusions about student achievement and the impact of integration on art, science knowledge and language arts performance. The artifacts included: 1) Art product--a representation of the student rock depicted with crayon and watercolor paint (Figure 1); 2)

Semantic word webs for (a) metamorphic rocks in general and (b) for students' specific metamorphic rock (Figure 2); 3) Cloze worksheet and rough draft for riddle (Figure 3); and 4) Final riddle as published (Figure 1).

Evidence of Learning

To organize the artifacts, we used an analytic frame that integrated all of the instructional components, tasks and standards as presented in Figure 4. The emphasis of the analysis was on find the connective threads among the instructional sequence, the products and standards.

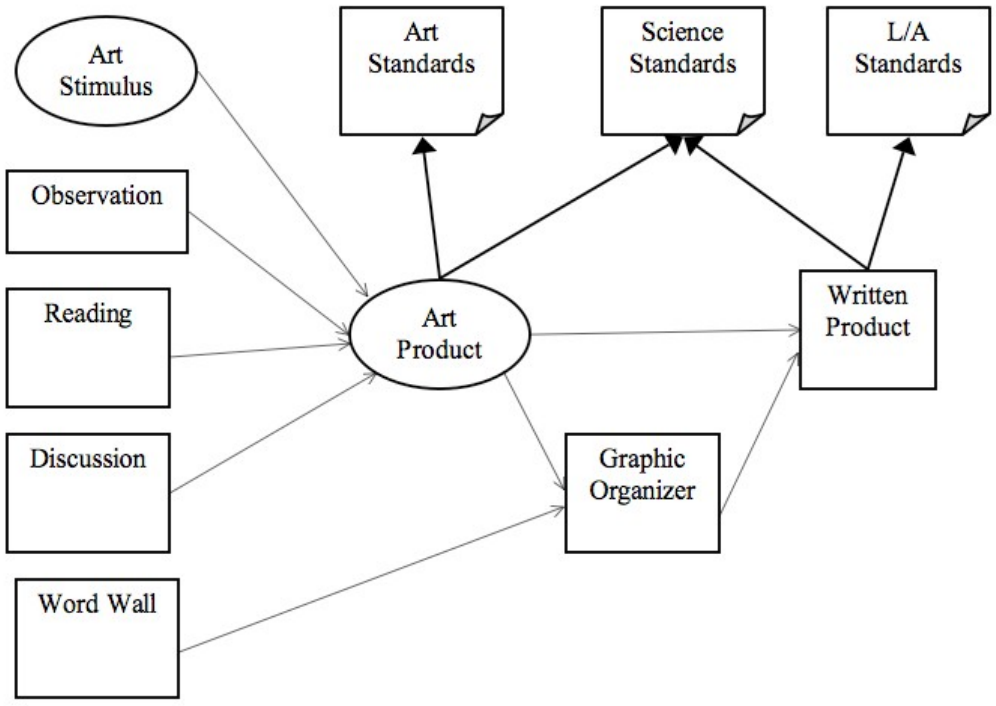

Figure 4. Analytic frame for artifact analysis

Sandra, an advanced student, observed her *feldspar* rock sample and recreated its irregular shape and pinkish color. Cracks were created either purposefully or by virtue of the water in the media. Her background color was a contrasting blue. Her semantic word web about metamorphic rock contained everything from the web created together in class. Her word web about her chosen metamorphic rock (feldspar) contained the words *coarse* and *pink*, observed from her own rock sample and also found on word walls. *Mineral first* and *was quartz* were obtained from reading material, and *reys car* (race car) was obtained from Sandra's own, or a classmate's, observations during oral sharing. In the final product, Sandra used a combination of facts and observations, some taken from each of the semantic word webs.

Christopher, a proficient student reading at grade level, observed his slate rock sample and created a gray outline in a pentagon shape with curved edges. He was able to represent its

layers by scratching the wet gray paint with a toothpick (Figure 1) His semantic word web about metamorphic rocks mirrored the class web, with erasures showing a self-correct from the general metamorphic informational web to the more specific information about slate. He was able to articulate visual aspects using the metaphors, *it looked like a diamond, it looks like a vase* and *it looks like it was stacked*, by looking not only at the rock itself, but at the art he had created to represent it. It was apparent he had the rock itself at his desk, as his descriptions included the textural qualities *it is smooth*, and *it is warm.* (Figure 2) In his final riddle, he included almost everything from his webs and inserted even more information. He added, *I am kind of sharp, I am sparkly.* and *I have a whole bunch of stuff on top of me in the earth.* (Figure 3)

Caroline, a student working at grade level, observed her epidosite rock sample and created its shape to depict both straight and curved edges. Variations of the main color were either intentional or an outcome of the water-based media. She also had brown spots on one-third of the rock. Her background was contrasting sections of color, not something she had observed, but wished to portray artistically. Her metamorphic rock word web contained everything from the web created together in class plus *holes* and *turquoise*, characteristics she had observed in her rock and possibly wrote down on this web rather than the one specific to her rock. The web about her epidosite rock contained the words, *rough* and *green*, from her observations and the word wall, and *heart* from her observation and her art (although her depicted shape had heart-like parts but not a typical "valentine" heart). Her riddle contained information from both webs but most were characteristics that she had observed in her own rock rather than statements about metamorphic rocks in general. In her final riddle she wrote, "I am green" at the beginning, and "I am turquoise." at the end. These are two somewhat conflicting statements of color, although green and turquoise are from the same color family. She was possibly trying (unsuccessfully) to create turquoise with paint mixing, but it turned out green. She reconciled that by including both in her riddle.

Luke, a student with average academic proficiency, observed his biotite schist rock sample and created its elongated irregular shape. He was able to show its main color of black with white specks with white crayon and a small dot of yellow with paint. His use of salt also helped him portray the rough texture of his rock. His background was contrasting sections bright colors. His metamorphic rock word web contained everything from the web created together in class, including (mostly correct) word spellings. His own biotite schist web contained the color words, *black, white* and *yellow*. He also included on that web the fact *mica first*, that he had obtained from one of the print resources in the classroom.

Leo, an academically struggling student, observed his marble rock sample and created its oval shape. He was able to depict its whiteness by using a white crayon on white paper as well as by maintaining the absence of paint within the rock shape. The background for his artwork is a contrasting dark blue with salt-produced texture. Leo's metamorphic rock web contained all classroom presented and modeled information. Also on this web was the specific information about his rock, *used for statues*, that he had gleaned from classroom reading and discussions. His personal marble web contained *white* and *cool*, information obtained from observation, both touch and sight. *Was sedimentary* and *limestone first* were facts obtained from classroom reading. In the final riddle, he included only information that pertained to his specific rock. He also included *smooth*, which was not in either web, but something he tactilely observed.

Patricia, a struggling English Learner, observed gneiss rock and created its highly irregular shape with one end oval and one end with a jagged section that would appear to have been created through breakage. She used black crayon for the outline and white crayon to create the color pattern of the rock makeup. Her background was blocks of different bright colors. Patricia's metamorphic rock contained information provided to the entire class. The web dedicated to her gneiss rock indicated color words found in her total art piece: *black, white, green, brown*, and not just her rock (black, white). She indicated (incorrectly) that it *was gneiss* on one of the web lines and *igneous* on another. This was information that had been interchanged--gneiss used to be igneous (written on one web, but not correctly transferred to the specific web about her rock). In her final riddle, she wrote, *I am a cool*, something tactilely observed, but not written on any of the previous graphic organizers. She wrote, *I with black specks am mostly white*, to describe her visual observations. Her sense of grammatical correctness is not yet developed.

Meeting Multiple Standards

The analysis of the student artifacts indicates that the students used their actual rocks to inform decisions they had made to create their artwork. All of the students tried to create the color of their rocks with crayon and watercolor paint, some of them attempting color mixing to accomplish this. Their shapes were not "cookie-cutter," but, rather, very unique and individual to reflect their growing observational skills. All were working toward proficient use of the media of watercolor-crayon resist as required in the second grade visual art standards.

The science content standard, *Rocks have different properties*, was evident in both art and writing samples of each child. We observed both artistic representations and written descriptions of texture, shape and color. We read additional facts the students had learned from print resources.

The language arts standard requiring the use of details in descriptions was generally met by using words that described the texture, shape and color. In two cases the descriptions included metaphor. All students completed the work and did not leave either the art or the writing unfinished. The students who were academically more advanced included more facts from the metamorphic web into their final product and also included metaphors in their writing. These more advanced students pulled many of the proficient students along with them. The higher-level discussions and advanced vocabulary usage raised the level of most of the students. The students who were learning English focused on the more concrete descriptive words. In all cases, the students were highly motivated to share their finished art depictions and riddles with their peers.

In conclusion, similar products were obtained from students across the continuum of academic levels. All students used the real rock to inform their observations and artistic and written creations. All students were engaged with the physical and concrete to complete a finished academic product. They also were able to articulate specific science content knowledge, in this case about metamorphic rocks.

Mrs. Johnson's classroom shows that purposeful, carefully implemented integration of visual art, science and the language arts can lead to positive outcomes. In this case, the sampled

students demonstrated increased performance across the three content domains. Students of all ability levels were able to discuss rocks using scientific and descriptive vocabulary correctly. Moreover, and perhaps most importantly, the use of an integrated curriculum, specifically using visual arts, has been instrumental in reducing the performance gaps in the classroom. Results highlight an alternative route to building the foundations for learning in the primary years. Instead of a narrow focus on basic skills in an isolated manner, we suggest an integrated approach that includes art, literacy and content, such as science that meets the mark on the basic literacy skills of reading, writing, listening and speaking at grade level, as well as deepening knowledge and abilities in arts and science. This may very well be a foundation that will provide all students with a wide world of ideas, vocabulary and ways of thinking and meet the common core standards of literacy.

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