The Effects of Visual Arts on Reading Comprehension of 3rd Grade Learners

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The Effects of Visual Arts on Reading Comprehension of 3rd Grade Learners

An Action Research Report
By Kelsey Gravalin and Kimberly Maki
The Effects of Visual Arts on Reading Comprehension of 3rd Grade Learners

By Kelsey Gravalin and Kimberly Maki

Submitted on August 9, 2013
in fulfillment of final requirements of the MAED degree
Saint Catherine University
Saint Paul, Minnesota
Abstract

The purpose of this research paper was to determine the effect of visual arts on comprehension skills of 3\textsuperscript{rd} grade students. The research study was implemented in a 3\textsuperscript{rd} grade classroom with the inclusion of an art teacher for a time period of 8 weeks during the months of April and May. We collected data to assess whether a visual arts project would affect comprehension scores on a quiz. We also collected pre and post attitude surveys and met with 2 focus groups. The results of this research indicated there was a slight increase of comprehension scores when a visual arts project was completed before the assessment. We plan to continue to monitor the success of our students’ comprehension when we add a visual arts project to the curriculum.
“The integration of cross-curriculum teaching techniques has been demonstrated to improve overall student performance. Teachers striving to incorporate art inspired instruction into their classrooms may enhance the students’ overall performance in other content areas.” (Hopper, 2010, p.3)

To enhance literacy, schools should be integrating art in all areas. Art programs promote creative thinking, opportunities for cognitive work, as well as give students better problem-solving skills in the areas of math and science as well as reading. Better habits of learning come from the idea that art gives students a more flexible way of thinking.

The setting of our action research will be in Kelsey’s 3rd grade classroom. Kim is a traveling art teacher that visits Kelsey’s room one time every week for 50 minutes. There are 22 students in the 3rd grade classroom. There are 10 boys and 12 girls. The student’s abilities range in reading skills from advanced readers to below grade level readers. Kelsey has a cluster group of gifted and talented students. Five students receive g/t (gifted/talented) services for Math and 6 receive g/t services for Reading. There are 2 Special Education students. One is OHI and the other is Autistic. 6 students receive either Title I Math or Reading services once a day every day of the week. Our school is about 70% free and reduced lunches, 11.2% of students are English Language Learners, and 14.1% of students are currently on an IEP (Individualized Education Plan).

We read many articles on the effects of visual arts on reading comprehension. We found information and data to support our topic of study. Students become more involved and active learners when it comes to doing an assignment that is “artsy” as opposed to passive, bored learners when no art is involved. “Officials further noted that
arts provide opportunities for students to feel successful because arts offer a variety of learning opportunities that meet a wide range of intelligences and learning styles.” (Gullat, 2007, p.214) Teaching to multiple intelligences is a long range goal of teachers. Since there are multiple intelligences among students, being able to reach some of them through artwork is an important task. A teacher’s main goal is to get through the curriculum in a timely fashion as advised by our districts. The children that would benefit from art implementation are suddenly those that are slipping through the cracks because teachers cannot find time to incorporate art projects into their already full days. It also holds true that art teachers should be incorporating reading strategies into their instruction so students have practice reading with every subject they are studying. Including reading about art in the art class will help students solidify concepts and vocabulary the teacher gives them orally.

“Student benefits of art integration include: Elaborate and creative thinking and problem solving, verbal and nonverbal expressive abilities, applied learning in new contexts, increased skills in collaboration, increased self-confidence, and higher motivation” (Brown, 2007, p.173) The benefits listed above aid students in every subject area as well as real world situations. Students that are able to apply their learning in new contexts will show advancement in reading comprehension by being able to make connections. Connections apply to their personal life, other texts they have read and other things that they have experienced through media and real-world situations. Students that are able to connect to texts in various ways have a better understanding of what they are reading.
Art plays a part in every student’s school career. Art teaches students to be aware of details in their lives. Whether it be walking across the street while looking for cars, knowing where a ball is in a sports game, or paying attention to details in a story, observation and awareness is key. “Art instruction guides students’ observations of the world around them. This increased aesthetic perception of natural and manmade phenomena enhances students’ sensibilities impacting artwork, writing and observational skills” (Andrzejczak, 2005, p.2). Students are aware that art is about adding details, therefore, if art is an integral part of a student’s schooling, they will carry over their attention to details in reading and writing.

“In one reading strategy called “Talking Drawings”, students are asked to create mental pictures of topics they will be studying” (Paquette, 2007, p.66). The teacher chooses a text, usually a non-fiction text, and asks students to draw what they know about the topic before she reads the passage. After the teacher is finished reading the passage, the student is asked to either redraw their picture or add to the one they previously made. This is a creative way of doing a KWL chart with students. It is more engaging for the students because they have to pay attention to details more closely so they can add to their pictures at the end. This method helps students organize their thinking, remember what is being read, and construct more meaning from the passage. Students can carry on this strategy in any book they read by drawing scenes as they read and adding more detail as they get further into their text.

Art can be used to check comprehension in many ways. Asking a student to draw a picture of what they have read about will show a teacher if a child has remembered any aspects from the book or passage read. If a student draws only a picture of the topic
with no relation to the story, it shows that they have previous knowledge on the topic, but that they do not comprehend the story that is being read. Drawing pictures of a story may also help students figure out what the main idea of a passage or story is and make that connection when reading other stories.

When children are drawing pictures of what they are reading, it shows teachers what the student was visualizing as they were going through the text. Assessing children’s artwork is another way to find out which students need interventions in the area of remembering details and other particular information. Students like to express their knowledge in a meaningful way, and using art is a way for them to feel confident in the way they express themselves since art, at the primary levels, is a non-threatening concept.

“One of the surest ways to improve reading comprehension with art is with graphs and charts. Since these are visual representations of information, it makes sense, and teachers in ALL subject areas would see improvement in comprehension if they put these to work for them” (Art in Education May Be Used to Increase Reading Comprehension Skills, 2011). Charts, graphs and graphic organizers are great ways to keep students’ thoughts clear and organized. Students are able to make sketches and drawings alongside their organizers which make both sides of the brain work together. Memory happens when both sides of the brain are actively working. This is a good tool to use to help students remember and comprehend important vocabulary terms especially if it is an area of difficulty.

Looking at illustrations in books is another way teachers can easily incorporate art in their daily teaching. Illustrations help prompt image making, can make reading more
enjoyable to some students and result in more positive behaviors towards reading in
general. Illustrations can provide students with knowledge that they do not have previous
to reading a new text. Poor readers, especially, will take illustrations and use them as
tools for understanding. Illustrations help readers convey important information and help
develop a deeper understanding of the book. Another way to use illustrations is to read a
picture book about a person or event before reading a longer more in-depth book about a
topic to build background knowledge. This way, a student is able to picture the events in
their brain easier as they read a different text that may have fewer illustrations.

Paying attention to details in picture books help students develop an
understanding of what a culture might be like or how a character might be feeling.
Illustrators take time to make sure that their pictures tell a story as well as the text that it
follows. By noting the details in a picture book students will develop a background
knowledge they may be able to draw upon in the future. Picture books help develop
visual literacy and can be especially helpful for the novice or emerging readers. When
readers develop visual literacy they are able to connect with a text and can help them
compose expression within a text.

Using visual arts in the classroom has many benefits. It would be an advantage to
many students if teachers integrated art into the regular curriculum. Art gives students an
opportunity to apply what they know and what they have learned into a visual
representation that they do not feel threatened to create. Through our research on the
topic of visual arts and how it impacts students in a positive way we have decided that
our topic will be “What effect will visual arts have on reading comprehension for 3rd
grade learners?” The next section will explain the research process we used to research our question.

Description of Research Process

For our study, we researched the effect that visual art has on reading comprehension for 3rd grade learners. Our research was implemented in one classroom over the course of 6 weeks in the months of April and May of 2013. Our data collection sources included 2 attitude surveys, comprehension quizzes, and 2 focus groups. Student work collected included student-made artworks after each passage.

We began our research by having a conversation about what was going to happen over the next few weeks and what our project was about. We asked the students orally how they felt about reading and art. We also inquired if they felt that doing an art activity that goes along with reading may or may not help them remember details to a story. After having a discussion with the class, they completed a short attitude survey (see Appendix A). The survey had 3 open-ended questions and 3 yes/no questions. Some questions required very little effort for the students to answer; such as, if they liked reading and art. The open-ended questions asked their input on why they would think that doing artwork would help them remember a story better, and what their favorite parts of reading and art were.

Next, we searched for grade-appropriate reading selections that included comprehension questions. We made sure the materials we utilized were similar to questions that they are used to answering on regular school assessments. We found a website of a teacher who published short stories for 3rd graders along with a comprehension quiz for each passage (see Appendices B-I). We chose 8 different
passages. Each passage is 3 or 4 paragraphs in length followed by an 8-10 question comprehension quiz consisting of fill in the blank and multiple choice questions. We had the students read the selection to themselves, followed by an oral reading from the teacher. The comprehension questions were also read out loud. The 8 stories and comprehension questions we chose to use were “Loggerhead Sea Turtle” (see Appendix B), “Buffalo of the Great Plains” (see Appendix C), “Butterflies” (see Appendix D), “Benjamin Franklin” (see Appendix E), “Emperor Penguins” (see Appendix F), “Harriet Tubman” (see Appendix G), “The Silk Road” (see Appendix H), and “Christopher Columbus” (see Appendix I).

We decided to do four comprehension quizzes immediately following the reading of the passages. The other four comprehension quizzes were given on the same day, after the reading and the art project. We alternated having the students reading and taking their quiz with and without the art project throughout our research process. We projected each passage onto the Smart Board so all students were able to see. Students were invited to sit closer to the screen if they needed to. Students were given adequate time to read the selection to themselves. After they finished reading the selection, it was read out loud by the teacher. When doing our research without the art piece, the student was given the comprehension quiz immediately following the oral reading of the passage.

There were additional steps included when doing the artwork in conjunction with reading the passages. When the students were creating their art, the passage was left on the screen for reference. After reading “Loggerhead Sea Turtle” students were asked to get out a pencil, black Sharpie and either crayons or colored pencils. The teacher provided a 9inx12in piece of white construction paper. The students were instructed to
use their pencil to create a picture of a Loggerhead Sea Turtle with as many details from the story as they were able to put on their paper. After they completed the details to the best of their ability they were then instructed to use a Sharpie to draw over the pencil lines and to color in their turtle with colored pencils or crayons, adding any other details they saw fit. The comprehension quiz for this passage was completed after their artwork was completed. When the reading of “Butterflies” was completed, the students were asked to get out a pencil, black Sharpie, colored pencils or crayons. The teacher provided the 9inx12in white construction paper. The students were then asked to divide their paper into fourths. Next they were asked to draw the four stages of a butterfly life cycle. They were again asked to be as meticulous as possible. When they were finished with their details they were instructed to trace their pencil lines with Sharpie and add color and details with crayons or colored pencils. The next passage that included an art project was “Emperor Penguins”. The medium for this project was Fimo clay. This is a type of clay that doesn’t harden until it is baked. This project took two 50 minute art periods to complete. The first class period they built the main structure of the penguin which included the midsection, wings, and head with black clay. The second class period focused on the details of the Emperor Penguin including his “dirty white” belly, the orange beak, and the yellow stripe on the side of its neck. The students were allowed to choose a base color that the sculpture would stand on. They were also given freedom to add one “silly” detail such as a hat or crown. The last passage that included artwork was “The Silk Road”. Students again were asked to take out a pencil, black Sharpie, and colored pencils or crayons. The teacher provided a 9inx12in piece of white construction paper. This passage gave them a little more freedom of what they wanted to draw. The
students were instructed to draw with pencil a picture that would depict the main ideas of the passage including as many details as possible. When they were finished they were asked to trace over their pencil marks with Sharpie and color in the details using colored pencils or crayons.

After our data collection was complete, the students were asked to fill out another Attitude Survey (see Appendix J). The survey included questions as to how they felt about themselves as readers and artists. It also gave them an opportunity to rate their level of interest in the areas of reading and art. Other questions examined if they would rather draw or write about what they have learned from a reading and if drawing pictures helps them to understand what they have read.

The last step of our data collection included a student focus group (see Appendix K). We met with 2 different small groups of 4 students in each group ranging in reading and comprehension ability. We asked 3 open-ended questions and took notes on their responses. Questions included do you think doing artwork will help you remember a story better and what are some different ways you could add art to a reading class?

Upon completing our data collection, we formulated answers to our question, “What effect will visual arts have on reading comprehension for 3rd grade learners?” In the next section we will analyze our data and determine if implementing a visual arts project enhances students’ reading comprehension skills.

Analysis of Data

Our research consisted of gathering data in Kelsey’s 3rd grade classroom. We gathered data for about 8 weeks in the months of April and May. Kelsey was in charge of reading the passages and giving the comprehension quizzes. Kim was in charge of
implementing a visual arts project for 4 of the passages. We were both involved with the grading of the quizzes. In analyzing our data, we used pre and post attitude surveys, comprehension quizzes, and focus groups. Our goal for the analysis portion was to examine whether visual arts has an effect on reading comprehension.

Prior to starting our research we supplied the students with an attitude survey (see Appendix A). The survey provided insight on what their favorite parts of art and reading are and if they think doing artwork will help increase their comprehension of a story. One of the open-ended questions was; “Why do you think artwork will help you remember a story?” The reason we had the students answer this question was so we could mention it throughout our project and be able to use their words to remind them why artwork may help them with their comprehension skills. Out of the 22 students in the classroom, 20 completed the survey. Of the students surveyed, 50% answered the question stated above with the response that doing artwork after reading a story will help them remember the story by looking back at their artwork. In addition, 15% of the students replied they would be able to see what the story was about by looking back at their artwork. We could tell already by this first piece of data that we had a visual group of students that should respond positively to our research.

While executing our action research project we decided to alternate giving the students the comprehension quiz with the art project and without the art project. The students read 4 different passages and were given comprehension quizzes after completing 4 different visual arts projects relating to the passages. The students scored a mean of 7.5 questions correct after completing a drawing and a quiz on “The Loggerhead Sea Turtle,” a mean of 4.5 questions correct after completing a drawing and a quiz on
“Butterflies,” a mean of 5.8 questions correct after completing a clay project and a quiz on “Emperor Penguins,” and a mean score of 4.2 after completing a drawing and quiz on “The Silk Road” (see Figure 1). While observing the students working on their art projects we noticed conversations happening about their art. This seemed to give them additional insight into the details they wanted to include in their projects by having conversations with their peers. Another observation made was when the students were taking their comprehension quizzes, they were answering quicker and with more confidence after having completed their visual arts projects.

Figure 1. The mean scores of comprehension quizzes that included a visual arts project.
The students were given an additional 4 passages and comprehension quizzes excluding the visual arts portion. The students scored a mean of 6.2 after completing a quiz on “Buffalo of the Great Plains,” a mean of 4.8 after completing a quiz on “Benjamin Franklin,” a mean score of 6 after completing a quiz on “Harriet Tubman,” and a mean score of 4.3 after completing a quiz on “Christopher Columbus” (see Figure 2).

![Bar chart](image)

**Figure 2.** The mean scores of comprehension quizzes without a visual arts project.

Looking at all of our data, we noticed a slight increase in the mean score of the comprehension quizzes that included the visual arts project. The mean score of the quizzes with a visual art project was 5.5 and the mean score of the quizzes without a visual arts project was 5.3. This shows that our students had slightly higher comprehension on the selected passages after they had done their piece of art that related
to the story. When students use multiple ways to monitor their understanding of the story, comprehension increases.

The next piece of data we looked at was another attitude survey. We used a different attitude survey than we did at the beginning of the research. The survey we ended with provided us with information about their attitudes towards reading and art and to what kind of learner each child is. Of the 22 students that took the survey, 98% agreed or strongly agreed with the statement that they are a visual learner and 59% of the students agreed that they would rather draw a picture than write about what they have read. However, only 41% of the students agreed with the statement that “Drawing pictures helps me understand what I read.” From the data of the previous 2 questions, we thought that the students didn’t know exactly what the question was asking since their results showed that they seemed to be visual learners.

The last piece of our research was the focus groups. We met with 2 different small groups consisting of 4 students each. The students ranged in reading and comprehension abilities. We asked each group 3 different questions. We took notes on how the students responded to each question and looked for commonalities in their responses. The first question we asked each group was “Do you think doing artwork after reading helps you remember the story better? Why?” A majority of the responses in both groups consisted of telling me that they think doing artwork after reading a story would help them remember a story better. Their reasons varied from “I can look at my picture and remember what the story was about” to “I try to put details in my pictures so I remember the details of the story better.” The second question asked each group was “What are some different ways you think we could add art to reading class?” They
seemed to pull from previous experience in the classroom such as making timelines, comic strips and mobiles. The last question was a general one about how they felt about helping us with our project. One student mentioned that maybe next time we could pick different art projects to work on so they didn’t have to just draw all the time. A different student added to the previous statement by asking if painting would be appropriate.

After compiling our data and explaining our results we found that the students’ comprehension increased slightly when adding a visual arts project. Next, we moved along into thinking about the future. How can we improve our research? What things need to change in order to give us more conclusive data? By improving our research we hope to find that visual arts improve comprehension in reading. We will explain what will be done differently in our action plan.

Action Plan

After analyzing our data we concluded that including a visual arts project with a reading passage increases reading comprehension in a 3rd grade classroom. In the future, we will continue to incorporate visual arts in all areas of classroom learning. Different visual arts projects will consist of timelines, comic strip drawings, mobiles, and various other techniques. Throughout the year our students will continue to demonstrate their comprehension skills through independent reading, partner reading, and small reading groups. We will continue to monitor the success of our students’ comprehension when we add a visual arts project to the curriculum.

The results of our research have convinced us that including a visual arts project when reading a story is truly beneficial to the comprehension of a story. Kelsey has reflected on her previous year of teaching and realized that the students were more
engaged in a story or subject when they were allowed to do something “fun” along with it. For example, when observing a plant growing for a science lesson, the students looked forward to adding the little details in their journals each time they made a new observation of their plant growth. It is also nice to see student art hung in the classroom so having students create different pieces of art to be displayed will give them motivation to do their best.

Educators are constantly asked to try new things in their classroom to improve student achievement. Incorporating a visual arts project within all areas of the curriculum is something we can work towards as we move forward in our research. Adding a piece of artwork with a reading, in any area, is a small and easy way to help improve comprehension. By sharing our findings and telling of our success of our research with others, we will be able to reach more students. We believe that not all students are visual learners; therefore, we need to appeal to other learners in the classroom as well such as the kinesthetic and auditory learners.

Adding performance/acting to show comprehension is an example of how we could reach a kinesthetic and auditory learner. By adding this type of tool, the students will be focusing on details such as setting, what the characters are wearing and the different props that characters use during the course of a story. A play would also keep students more aware to recall specific events of the story. By reading and rereading their play, fluency will also improve as well as their confidence.

Another way to add visual arts would be to have students present what they have read orally in front of the class, small group, or teacher. In addition to an oral report, they
could have a poster designed to go along with their report that could show a critical part of the story or simply their favorite part of the story.

There are many changes that we would make to improve our research in the future. One thing we would change is to make sure that when we are comparing a comprehension quiz with and without an artwork, that the reading passages are similar. For example, both the passages should be about an animal or about a person. We think that if we would have been more consistent with the types of passages the students read and were quizzed on, our results would have shown more of an increase when a visual arts project was included with a reading. Another thing we could have changed would have been to use 4 different mediums when completing the artworks so the students would have more variety. This also came through when talking with our students during our focus groups at the end of our research project. Kelsey has thought about incorporating many different mediums with art projects that go along with the curriculum with the help of Kim’s resources as an art teacher in our school.

Writing is an area that our district is currently trying to embrace and enhance. In addition to adding visual arts to all area of the curriculum, it would be beneficial to add a small writing piece to go along with each piece of art that the students create. Therefore the students that are not as confident in their art skills, may shine in the area or writing.

Kim has decided that she will include more literature in her curriculum that will mesh well with her planned curriculum. She will work on finding appropriate literature to enhance her teaching units. With the addition of literature in her art class, reinforcement of how important literature is will resonate with the students.
With the conclusion of our research, we hope to advocate for visual literacy inclusion in all areas of curriculum. We hope to share our ideas not only with colleagues but with our specialists and principal by means of PLC’s and staff meetings. With the ease of adding art into daily work in classrooms, we hope to reach more students and improve comprehension as a whole.
References


Art in Education. (2011) *Art in education may be used to increase reading comprehension skills*. Retrieved February 13, 2013 from [http://www.teacher-support-force.com/artineducation.html](http://www.teacher-support-force.com/artineducation.html)


Appendix A

Name__________________________________________

Do you like reading?

Do you like art?

Do you think doing artwork would help you remember a story?

Why do you think doing artwork would help you remember a story?

What is your favorite part about reading?

What is your favorite part about doing art?
Appendix B
Readings and quizzes are printable from Mr. Nussbaum’s website

Loggerhead Sea Turtle

**Description**: The Loggerhead Sea Turtle is named for its large head and blunt jaw. This huge sea turtle can grow to 800 pounds (though the average turtle is about 200 pounds) and three and a half feet in length. It is the largest hard-shelled turtle in the world. The carapace (shell) and flippers are reddish brown and the plastron (lower shell) is yellowish. The carapace has five lateral scutes and five central scutes. Scutes are hexagonal sections of the carapace. Underparts are white or whitish. These incredible turtles have powerful flippers that can propel them through the water at speeds of up to 16 miles per hour. The Loggerhead Sea Turtle has a life span of up to 50 years in the wild.

**Habitat/Range**: The seafaring Loggerhead Sea Turtle is found throughout the world’s tropical oceans. They are also found in temperate waters in search of food and in migration. Breeding populations exist in many locales including the Atlantic coast of the United States (from North Carolina to Florida), numerous Caribbean islands, Central America, the Mediterranean Sea, and Africa.

**Diet**: Loggerhead Sea Turtles consume fish, crustaceans, mollusks, crabs, and jellyfish. They use their powerful jaws to crush prey. These turtles often ingest stray plastic bags which are mistaken for jellyfish and which cause potentially fatal complications.

**Nesting**: The Female Loggerhead Sea Turtle normally lays her eggs on the same beach in which she was born. It may take up to 30 years before these turtles reach reproductive age. In June or July, females will emerge from the ocean and dig a hole in the sand. Between 70 and 150 eggs are deposited in the hole. The female uses her hind flippers to cover the hole. The eggs are about the size of ping pong balls. Eggs hatch within 65 days. Young turtles instinctively head toward the ocean upon hatching (which reflects the moonlight). Many of these young turtles are taken as prey by opportunistic gulls, vultures, and raccoons. Others are led in the wrong direction by lights from roads and beach houses which the turtles mistake as moonlight. Those that are fortunate enough to make it to the water are swept toward the open ocean by waves and sea currents.
1.) Why is this species named Loggerhead Sea Turtle?
   A. It has a large head.
   B. It rests its head on logs.
   C. It hunts on logs.
   D. No one knows.

2.) What shape are scutes?
   A. Square
   B. Hexagonal
   C. Diamond
   D. Octagonal

3.) Which of the following is not part of the turtle's shell?
   A. Scute
   B. Plastron
   C. Tali
   D. Carapace

4.) Which of the following is NOT true?
   A. Loggerhead Sea Turtles can live 50 years.
   B. Loggerhead Sea Turtles are negatively affected by trash that makes its way into the sea.
   C. Baby Loggerhead Sea Turtle, by instinct, stray away from light when they hatch.
   D. There are no hard-shelled turtles larger than the Loggerhead Sea Turtle.

5.) Loggerhead Sea Turtles DO NOT eat...
   A. Dolphins
   B. Jellyfish
   C. Mollusks
   D. Crabs

6.) Where would you most likely NOT see a Loggerhead Sea Turtle?
   A. Off the coast of Africa.
   B. In Lake Michigan
   C. The Caribbean Sea
   D. In the ocean near South Carolina.

7.) Where do female Loggerhead Sea Turtles lay eggs?
   A. On the beach of their birth.
   B. On gravel surfaces away from the beach.
   C. On any beach that does not have people.
   D. At the bottom of the ocean.

8.) What does the word "fatal" mean in the following sentence?
   These turtles often ingest stray plastic bags which are mistaken for jellyfish and which cause potentially fatal complications.
   A. Confusing
   B. Painful
   C. Annoying
   D. Deadly

What does the word "emerge" mean in the following sentence?

In June or July, females will emerge from the ocean and dig a hole in the sand. Between 70 and 150 eggs are deposited in the hole.
   A. Swim away from
   B. Come from
   C. Return to
   D. Give birth to

10.) Which is not true about Loggerhead Sea Turtle eggs?
   A. They hatch within 65 days.
   B. They are poisonous to predators.
   C. They are laid in the sand.
   D. They are shaped like ping pong balls.
Appendix B
Student Samples
Appendix C

Buffalo of the Great Plains

The great herds of buffalo that roamed the plains were essential for all parts of Sioux life and society. For most Sioux villages, "home" was wherever the herds of buffalo roamed.

Before the introduction of the horse, Sioux warriors would hunt the buffalo by dressing up as wolves as tricking them into running off of cliffs and ledges. They would also dress up in buffalo skins and make crying sounds like a baby buffalo. When an adult buffalo went to investigate, the warriors would kill it with spears and arrows.

The Sioux Indians used the entire buffalo following a kill. The buffalo hide was used for making tepees, clothes, moccasins, and robes. The hair was used to make rope and the horns were used as cups and dishes. Children fashioned sleds out of buffalo ribs, and buffalo fat was used as glue. Most importantly, buffalo meat provided food for the entire village. Much of the buffalo meat that was collected was cocked, dried, and pounded into pemmican (sort of like modern-day beef jerky).
### Appendix C

<table>
<thead>
<tr>
<th>1.) Buffalo hair was used to make</th>
<th>6.) Buffalo hides were not used for ....</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A. Teepees</td>
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<tr>
<td></td>
<td>B. Cups</td>
</tr>
<tr>
<td></td>
<td>C. Robes</td>
</tr>
<tr>
<td></td>
<td>D. Moccasins</td>
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<table>
<thead>
<tr>
<th>2.) Buffalo ribs were used to make</th>
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</table>

<table>
<thead>
<tr>
<th>3.) Buffalo meat was not....</th>
<th>7.) A Sioux hunter dressing up as a wolf in an attempt to scare a buffalo is an example of ....</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Fried</td>
<td>A. Selfishness</td>
</tr>
<tr>
<td>B. Cooked</td>
<td>B. Selflessness</td>
</tr>
<tr>
<td>C. Pounded</td>
<td>C. Imitation</td>
</tr>
<tr>
<td>D. Dried</td>
<td>D. Worship</td>
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<tr>
<th>4.) Which of the following statements is true?</th>
<th>8.) The introduction of the horse probably made the Sioux more</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The Sioux Indians were somewhat dependent on the buffalo.</td>
<td>A. Mobile</td>
</tr>
<tr>
<td>B. The Sioux Indians were totally dependent on the buffalo.</td>
<td>B. Effective in Hunting</td>
</tr>
<tr>
<td>C. The Sioux Indians were not dependent on the buffalo.</td>
<td>C. Effective in Battle</td>
</tr>
<tr>
<td>D. The Sioux Indians were fairly dependent on the buffalo.</td>
<td>D. All of the above</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.) What likely changed after the Sioux became familiar with the horse?</th>
<th>9.) Which of the following best describes the hunting techniques of the Sioux before the introduction of the horse?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Hunting techniques</td>
<td>A. Strange</td>
</tr>
<tr>
<td>B. Buffalo as the main source of food for the Sioux.</td>
<td>B. Resourceful</td>
</tr>
<tr>
<td>C. How buffalo meat was cooked and prepared.</td>
<td>C. Selfish</td>
</tr>
<tr>
<td>D. The way in which the buffalo was used for clothing</td>
<td>D. Ravenous</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10.) In which of the following places would you be likely to find a buffalo herd?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Forest</td>
<td></td>
</tr>
<tr>
<td>B. Beach</td>
<td></td>
</tr>
<tr>
<td>C. Swamp</td>
<td></td>
</tr>
<tr>
<td>D. Open Field</td>
<td></td>
</tr>
</tbody>
</table>
Butterflies

Butterflies are some of the most interesting insects on the planet Earth. There are more than seventeen thousand different kinds of butterflies! Butterflies come in all shapes and sizes.

Butterflies go through four main stages of life. The first stage is the egg stage followed by the larva stage. As a larva, or caterpillar, the future butterfly eats as much as possible. As it grows, it sheds its outer skin, or exoskeleton. This may happen four or five times. After a few weeks, the caterpillar enters the next stage of its life, the chrysalis stage. In the chrysalis, the caterpillar will liquefy into a soup of living cells. Then, it will reorganize into a butterfly and the metamorphosis is complete. In later parts of the chrysalis stage, you can see the forming butterfly through the chrysalis.

When the butterfly emerges from the chrysalis, it pumps its wings to send blood through them so that it can fly. Most butterflies only live a couple of weeks, just enough time to drink flower nectar and to mate. Some, like the Monarch Butterfly, however, may live many months.
Appendix D

1.) How many stages of life does a butterfly go through?
2.) Which of the following is NOT true?
   A. Butterflies must wait until blood drains into their wings before flying.
   B. The butterfly may shed its skin 8 or 9 times
   C. Caterpillars turn into a liquid in the chrysalis
   D. Most butterflies live a short time
3.) In what stage does the metamorphosis happen?
   A. Butterfly
   B. Caterpillar
   C. Chrysalis
   D. Egg
4.) Which is true?
   A. There are about a thousand different kinds of butterflies in the world.
   B. There are more than a thousand different kinds of butterflies in the world.
   C. There are less than a thousand different kinds of butterflies in the world.
   D. There is only one kind of butterfly in the world.
5.) Why does the butterfly shed its skin?
   A. It is hungry
   B. The butterfly is coming
   C. It is growing
   D. To defend itself against predators
6.) What is the second stage of life for a butterfly?
   A. Larva
   B. Chrysalis
   C. Butterfly
   D. Egg
7.) What is the third stage of life for a butterfly?
   A. Larva
   B. Chrysalis
   C. Butterfly
   D. Egg
8.) Circle all of the things a butterfly does.
   A. goes through metamorphosis
   B. lays eggs
   C. mates
   D. drinks nectar from flowers
Appendix D

Student Samples
Benjamin Franklin

Benjamin Franklin was one of the most important Americans in history. In the early part of his life, Franklin was a business person and inventor. He ran the Pennsylvania Gazette (newspaper) and also published Poor Richard's Almanac. Poor Richard's Almanac was very popular because it made predictions about the future and had wise sayings. Ben Franklin also invented the Franklin stove, lightning rod, bifocals (eyeglasses), and started America's first library. He is probably best known for his kite experiment which proved electricity could be harnessed from lightning.

In the later part of his life, Franklin became interested in politics. He spent many years in England before coming back to America. In 1776, Franklin helped Thomas Jefferson write the Declaration of Independence. Two years later, he went to France and convinced the French to help America in the war against England. After the war, Franklin joined the Continental Congress and signed the Constitution. He died in 1790. Today, Ben Franklin is honored on the $100 dollar bill. His name is honored on highways, schools, and businesses across America.
Appendix E

1.) Which of the following is something invented by Ben Franklin?
A. Headphones
B. Electricity
C. Bifocals
D. Kites

2.) Which is something that may have been found in Poor Richard’s Almanac?
A. Directions for operating a soda machine.
B. The score of a football game.
C. “A penny saved is a penny earned”.
D. People’s phone numbers.

3.) Ben Franklin started America’s first _____________.

4.) Ben Franklin proved electricity could be harnessed from _____________.

5.) In the later part of his life, Franklin became interested in _____________.

6.) Which of the following did Ben Franklin not do?
A. Become President
B. Sign the Constitution
C. Help with the Declaration of independence
D. Travel to England

7.) What happened first?
A. Franklin goes to France.
B. 1776.
C. Franklin signs the Constitution.
D. Franklin goes to England.

8.) Today, Ben Franklin is honored on the ________ dollar bill.
Emperor Penguins

**Description:** The Emperor Penguin is the world's largest and tallest penguin. It is also the heaviest penguin, with some individuals recorded at nearly 100 pounds. Adults have a black head, back, tail, and black wings. The underparts are dingy white. The sides of the neck are marked with a large golden or yellow stripe. In addition, there is a varying amount of gold on the upper breast. Like most penguins, the Emperor Penguin has thick, waterproof feathers that cover the entire body except for the bill and feet. Emperor Penguins normally live about 20 years in the wild, though some individuals have been recorded at 40 years of age.

**Diet:** Crustaceans, krill, and small fish. Emperor Penguins will dive to depths of 800 feet in search of food. Most dives last 3-6 minutes.

**Predators:** Sharks, Leopard Seals, Orcas. Chicks are vulnerable to predation from South Polar Skuas.

**Range:** The Emperor Penguin is found throughout the Antarctic perimeter. It is the only species of penguin to breed during the Antarctic winter. Breeding takes place about 60 miles from the coast in the Antarctic interior, where temperatures regularly drop to -40 degrees Celsius. The trek from the Antarctic coastline to the breeding grounds was the inspiration for "March of the Penguins".

**Nesting:** Female Emperor Penguins lay a single egg in May or June. After the egg has been laid, the female must immediately feed in the ocean. First, the egg is carefully transported to the male, who incubates the egg under a broad patch that rests above the feet. Occasionally, the transfer is unsuccessful and the egg rolls onto the ice and instantly freezes.

The male will incubate the egg for up to 55 days! During this time, he will not eat a single meal. On particularly cold days, hundreds of male penguins may gather together in a compact huddle to warm themselves in the pounding Antarctic winds. In about two months, the female returns and locates her mate and chick by sound. She regurgitates food stored in her stomach to feed the growing chick. The male then takes his turn feeding in the ocean and returns after about a month, at which point both parents tend to the chick by regurgitating food and keeping it off the ice. Once the chick is about seven weeks old, it joins other chicks in a creche (huddle) to keep warm.

**Status:** Populations of Emperor Penguins are thought to be stable. Estimates indicate about 200,000 breeding pairs.
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What color is the tail of the Emperor Penguin?</td>
<td>A. Yellow</td>
</tr>
<tr>
<td></td>
<td>B. Black</td>
</tr>
<tr>
<td></td>
<td>C. White</td>
</tr>
<tr>
<td></td>
<td>D. Orange</td>
</tr>
<tr>
<td>2. Which of the following is NOT true?</td>
<td>A. The male incubates for more than two months without eating.</td>
</tr>
<tr>
<td></td>
<td>B. The female lays an egg during the Antarctic winter.</td>
</tr>
<tr>
<td></td>
<td>C. Sometimes, the egg transfer from the female to male results in the egg freezing.</td>
</tr>
<tr>
<td></td>
<td>D. After the female lays the egg, the male must immediately feed in the ocean.</td>
</tr>
<tr>
<td>3. Which of the following scenarios is unlikely?</td>
<td>A. Finding an Orca that has just eaten an Emperor Penguin.</td>
</tr>
<tr>
<td></td>
<td>B. Finding an Emperor Penguin weighing 80 pounds</td>
</tr>
<tr>
<td></td>
<td>C. Finding an Emperor Penguins after it has been underwater for 10 minutes.</td>
</tr>
<tr>
<td></td>
<td>D. Finding an Emperor Penguin that is 80 years old.</td>
</tr>
<tr>
<td>4. Which of the following is NOT part of the diet of the Emperor Penguin?</td>
<td>A. Krill</td>
</tr>
<tr>
<td></td>
<td>B. Crustaceans</td>
</tr>
<tr>
<td></td>
<td>C. Fish</td>
</tr>
<tr>
<td></td>
<td>D. Insects</td>
</tr>
<tr>
<td>5. Where do Emperor Penguins breed?</td>
<td>A. In the water</td>
</tr>
<tr>
<td></td>
<td>B. South America</td>
</tr>
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<td></td>
<td>C. Antarctic Interior</td>
</tr>
<tr>
<td></td>
<td>D. Along the coast</td>
</tr>
<tr>
<td>6. How many eggs are laid by the female Emperor Penguin?</td>
<td>A. 0</td>
</tr>
<tr>
<td></td>
<td>B. 3</td>
</tr>
<tr>
<td></td>
<td>C. 1</td>
</tr>
<tr>
<td></td>
<td>D. 2</td>
</tr>
<tr>
<td>7. At the end of the passage, a line reads &quot;Populations of Emperor Penguins are thought to be stable. Estimates indicate about 200,000 breeding pairs.&quot; What does stable mean?</td>
<td>A. Decreasing</td>
</tr>
<tr>
<td></td>
<td>B. Uncertain</td>
</tr>
<tr>
<td></td>
<td>C. Increasing</td>
</tr>
<tr>
<td></td>
<td>D. Staying the Same</td>
</tr>
<tr>
<td>8. Which of the following animals only preys on Penguin chicks?</td>
<td>A. Seals</td>
</tr>
<tr>
<td></td>
<td>B. Sharks</td>
</tr>
<tr>
<td></td>
<td>C. Skuas</td>
</tr>
<tr>
<td></td>
<td>D. Orcas</td>
</tr>
<tr>
<td>9. Select all of the following that are TRUE</td>
<td>A. After the egg is laid, the male goes off to the sea first.</td>
</tr>
<tr>
<td></td>
<td>B. The female locates her chick by sound.</td>
</tr>
<tr>
<td></td>
<td>C. Both parents will feed chicks by regurgitating food.</td>
</tr>
<tr>
<td></td>
<td>D. The female locates her chick by sight.</td>
</tr>
<tr>
<td>10. What happens third?</td>
<td>A. The male feeds in the ocean while the female tends to the chick.</td>
</tr>
<tr>
<td></td>
<td>B. The egg transfer</td>
</tr>
<tr>
<td></td>
<td>C. The young penguin joins a creche.</td>
</tr>
<tr>
<td></td>
<td>D. The female feeds in the ocean while the male incubates</td>
</tr>
</tbody>
</table>
Appendix F
Student Samples
Appendix G

Harriet Tubman Reading Comprehension

Harriet Tubman was born a slave. In the 1800s, slaves were African-American people who were forced to work. They were “owned” by their masters and had no rights. They could be bought and sold, and ripped away from their families forever. Harriet Tubman wanted a better life. She ran away from her “owners” on what came to be known as the Underground Railroad. The Underground Railroad was not really underground and it was not really a railroad. It was a series of long paths through the woods that lead to freedom for slaves in the Northern United States. It was very dangerous, and very long, but Harriet Tubman made it to freedom!

After Harriet became free, she helped her family members and other slaves to freedom along the Underground Railroad. Southern slave owners were very angry with Harriet, and offered large rewards for anyone who could capture her. Harriet, however, was never captured. In all, she helped over 300 slaves to freedom in the North. Former slaves called her “Moses.” That is one reason why Harriet will be known forever as the Conductor of the Underground Railroad.
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Answer</th>
<th>Answer</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Slaves...</td>
<td>A. had a lot rights</td>
<td>B. had no rights</td>
<td>C. were never sold</td>
<td>D. were not forced to work</td>
</tr>
<tr>
<td>2. The Underground Railroad was...</td>
<td>A. a train</td>
<td>B. underground</td>
<td>C. in the woods</td>
<td>D. in the air</td>
</tr>
<tr>
<td>3. What did Harriet Tubman do after she became free?</td>
<td>A. She got a job</td>
<td>B. She made people call her Moses</td>
<td>C. She built the Underground Railroad</td>
<td>D. She started helping other slaves to freedom</td>
</tr>
<tr>
<td>4. Which of the following is NOT true?</td>
<td>A. Harriet Tubman owned slaves</td>
<td>B. Southern slave owners were angry with Harriet</td>
<td>C. Harriet Tubman ran away to get a better life</td>
<td>D. Harriet Tubman would never be captured</td>
</tr>
<tr>
<td>5. Susan B. Anthony was NOT a(n)...</td>
<td>A. author</td>
<td>B. abolitionist (person against slavery)</td>
<td>C. President of an organization</td>
<td>D. Member of Congress</td>
</tr>
<tr>
<td>6. How did Southern slave owners feel about Harriet Tubman?</td>
<td>A. They liked her</td>
<td>B. They wanted her captured</td>
<td>C. They thought she should be free</td>
<td>D. They didn’t really care</td>
</tr>
<tr>
<td>7. Which of the following best described Harriet Tubman?</td>
<td>A. A woman who was captured trying to bring others to freedom</td>
<td>B. A woman who was against slavery</td>
<td>C. A woman who was scared of trying to become free</td>
<td>D. A woman who helped as many as 300 slaves to freedom on the Underground Railroad</td>
</tr>
<tr>
<td>8. Which of the following would probably NOT be a title for this passage?</td>
<td>A. Harriet Tubman and the Underground Railroad</td>
<td>B. The Life and Times of Harriet Tubman</td>
<td>C. Harriet Tubman: The Conductor</td>
<td>D. The Life of a Southern Slave Owner</td>
</tr>
<tr>
<td>9. Which of the following questions is NOT answered in the passage?</td>
<td>A. Was Harriet Tubman a slave?</td>
<td>B. How old was Harriet Tubman when she ran away?</td>
<td>C. What was the Underground Railroad?</td>
<td>D. Did Harriet help other slaves to freedom?</td>
</tr>
</tbody>
</table>
Appendix H

The Silk Road

In 1274, Italian explorers Marco and Niccolo Polo set out on a 24 year journey in which they traveled the famous Silk Road from Italy, through brutal deserts and towering mountains to eastern China. They traveled over 4,000 miles in all. Marco and Niccolo were among the very first Europeans to explore the fabled empire of China. In China, Marco Polo even worked for ruler Kublai Khan. Polo detailed his experiences and findings in China by writing a book. Polo described materials and inventions never before seen in Europe. Paper money, a printing press, porcelain, gunpowder and coal were among the products he wrote about. He also described the vast wealth of Kublai Khan, as well as the geography of northern and southern China. European rulers were very interested in the products Polo described. However, trading for them along the Silk Road was dangerous, expensive and impractical. European rulers began to wonder if there was a sea route to the east to get the products they wanted at a reasonable price.
## Appendix H

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
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<th>Question</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>How many years did Marco Polo's journey to China</td>
<td></td>
<td>While traveling in China, Marco Polo observed many new discoveries. Which of the following is not one of the discoveries?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A. cigarettes</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Marco Polo traveled over ___________ miles in his travels to China.</td>
<td></td>
<td>B. paper money</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>In China, Marco Polo worked for ___________ the ruler of China.</td>
<td></td>
<td>C. gunpowder</td>
<td></td>
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<tr>
<td>4</td>
<td>Marco Polo came to China from what country?</td>
<td></td>
<td>D. coal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. England</td>
<td>B. Europe</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. Europe</td>
<td>C. Italy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C. Italy</td>
<td>D. China</td>
<td></td>
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<td>8</td>
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</tbody>
</table>

24  4,000  Kublai Khan  A  Niccolo  D  searoute

---

5.) While traveling in China, Marco Polo observed many new discoveries. Which of the following is not one of the discoveries?
A. cigarettes  
B. paper money  
C. gunpowder  
D. coal

6.) Marco Polo traveled to China with ___________ Polo.

7.) What word below best captures the meaning of "impractical" in the sentence:
   However, trading for them along the Silk Road was dangerous, expensive and impractical.
   A. positive  
   B. ridiculous  
   C. not funny  
   D. too difficult

8.) Because of the difficulties in traveling the Silk Road, European rulers began wondering if there was a ___________ route to the east.
Appendix H

Student Samples
Appendix H
Student Samples
Christopher Columbus was born in Genoa, Italy in 1451. While spending most of his early years at sea, Columbus began to believe that he could find a shortcut to the Indies by sailing west across the Atlantic Ocean. Unfortunately, the King of Portugal refused to finance such a trip, and Columbus was forced to present his idea to the King and Queen of Spain. In 1492, King Ferdinand and Queen Isabella agreed to pay for his trip. They gave him a crew and three ships, the Nina, Pinta and Santa Maria. Columbus sailed aboard the Santa Maria.

The trip was long and hard. Many sailors grew restless and wanted to turn around. After two months at sea, land was finally sighted. The ships docked on the island of Hispaniola. Columbus named the native people he saw "Indians," because he believed he had found the shortcut he was looking for. In actuality, Columbus found North America, a brand new continent at that time. Columbus, however, couldn't be convinced. He died with the belief he had found the shortcut to the Indies. Soon, however, other explorers and nations understood the importance of his discoveries. Columbus' discoveries set the stage for the Age of Exploration: one of the most fascinating and exciting times in world history.
### Appendix I

1.) Where was Christopher Columbus born?
   - A. The New World
   - B. Portugal
   - C. Spain
   - D. Italy

2.) Columbus believed he could find a shortcut to the _________.

3.) The King of _________ refused to finance (provide money) for Christopher’s trip.

4.) In the year ________ Christopher Columbus set sail.
   - 1) 1480
   - 2) Indies
   - 3) Spain
   - 4) Portugal
   - 5) C
   - 6) Indians
   - 7) C
   - 8) C

5.) Which is not True?
   - A. Columbus was born in Italy
   - B. Columbus received three ships and a crew from the King and Queen of Spain
   - C. Columbus found a shortcut to the Indies
   - D. The journey across the Atlantic took two months

6.) What did Columbus name the native people he saw?

7.) Which of the following was NOT one of his ships?
   - A. Nina
   - B. Pinta
   - C. Isabella
   - D. Santa Maria

8.) Why was Christopher Columbus very important?
   - A. He believed he found a shortcut to the Indies
   - B. He first used the word “Indians”
   - C. He discovered a whole new continent
   - D. He was one of the bravest explorers of all time
Appendix J

<table>
<thead>
<tr>
<th>Attitude Survey</th>
<th>Number:________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>Agree</td>
</tr>
<tr>
<td>1. I am a good reader.</td>
<td>4</td>
</tr>
<tr>
<td>2. I understand what I read.</td>
<td>4</td>
</tr>
<tr>
<td>3. I am a good artist.</td>
<td>4</td>
</tr>
<tr>
<td>4. I enjoy drawing.</td>
<td>4</td>
</tr>
<tr>
<td>5. I enjoy reading.</td>
<td>4</td>
</tr>
<tr>
<td>6. I understand what I read better if there are pictures.</td>
<td>4</td>
</tr>
<tr>
<td>7. I would rather draw a picture to show what I've learned than write what I have learned.</td>
<td>4</td>
</tr>
<tr>
<td>8. Drawing pictures helps me understand what I read.</td>
<td>4</td>
</tr>
<tr>
<td>9. I am a visual learner.</td>
<td>4</td>
</tr>
<tr>
<td>10. I like doing projects to show what I have learned.</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix K

Focus Group Questions

1. Do you think doing artwork after reading helps you remember the story better? Why?

2. What are some different ways you think you could add art to a reading class?

3. Do you have anything to add about what Mrs. Maki and I have done with you in regards to our project?