

# **PICTURING SCIENCE**

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## **RESOURCE GUIDE**



P R E L

# Picturing Science

*Picturing Science* is an instructional approach that enables teachers to integrate their science instruction with art, language, technology, and specifically writing. *Picturing Science* uses strategies that work particularly well for ESL students, such as explicit vocabulary teaching and opportunities to use new vocabulary in both their speaking and writing. Teachers utilizing the *Picturing Science* approach start with a science unit and the specific benchmarks, often emphasizing issues of the local environment and culture.

Focusing on a central theme or essential question (e.g., How does a living organism use each of its parts to survive? or How is conservation important to our indigenous plants?), students work in groups to take photographs, label and draw the environment around them. They can use digital or disposable cameras, create observational drawings, or discuss artifacts of what they are studying.

After observing and documenting, their images are used to label parts and to develop concepts and words about their images. The focus on pulling the vocabulary from images, thus making the vocabulary concrete is known to be highly successful with ESL. The student is asked to write both scientifically and creatively about their images using both the science and language vocabulary. *Picturing Science* incorporates several ways to develop student writing, including building vocabulary through labeling, drawings, brainstorming descriptive words, phrases, using directional words and analogies describing their image. The final result is a showcase of student images and words that tie into the science units studied in the classroom.

Teachers will be able to:

1. Encourage students to look at their environment through new perspectives using digital photography and art;
2. Engage students in cooperative learning activities that promote higher level thinking skills of analysis, synthesis, and evaluation;
3. Develop and implement lesson plans that meet science, visual arts, and language arts standards;
4. Reach a wide spectrum intelligences with an emphasis on the English Language Learner through the use of auditory, visual and kinesthetic learning strategies;
5. Allow students and teachers an alternative means of assessment in science;
6. Document student learning through video, photographs, student work and student and teacher reflections occurring throughout the course.

## Educated Opinions

# Picturing Science: Literally a Vision!

By Lori Phillips, EdD

Pacific Resources for Education and Learning (PREL), a Hawaii nonprofit serving the educational community, is focusing on creating a vision of

children using the visual environment as access to science literacy. PREL's Picturing Science project engages students in both intuitive and analytical thinking about science. This instructional approach enables teachers to integrate their K–12 science instruction with art, language structure, technology, and writing. Picturing Science strategies, such as explicit vocabulary teaching and incorporating new vocabulary in speech and writing, work particularly well for English language learners. Teachers using the Picturing Science approach start with a science unit and specific benchmarks—often emphasizing local environmental and cultural issues.

Focusing on a central theme or essential question (e.g., What are living things made of?), students work in groups to photograph and draw the environment around them. They can use digital or disposable cameras, as well as create observational drawings of the objects they are studying.

After documenting their observations through drawing and photography, students label parts and begin to develop vocabulary from their images. This focus on making science vocabulary concrete through creating images is known to be highly successful with all learners. Students are asked to write both scientifically and metaphorically about their images. Several strategies are used to develop student writing: building vocabulary through drawing, brainstorming descriptive words and phrases, and using directional words and analogies to describe images. The final result is a showcase of student images and writing that shows what students know and have learned about science.

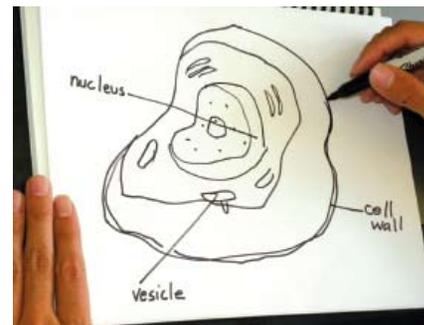
Picturing Science consists of three elements: 1) increasing vocabulary knowledge; 2) applying word knowledge; 3) writing purposefully in cognitively rich contexts.

The first element—increasing vocabulary knowledge—asks the student to use other modes of learning (i.e., observational drawing, photography, symbols, and gestures) to label and



Elementary students drew pictures of cross section of a pumpkin, then used their drawings to explain how the various structures function during a Picturing Science lesson.

collect vocabulary about the content studied. In the example to the below, students use observational contour drawing to visualize in detail and label parts of cells in the human body and create a vocabulary web (e.g., nucleus, mitochondria, cell wall, or vacuoles).



The important neuron cell, stretches out like a sticky spider web waiting for the next task to come his way. The neuron cell lies in the nerves and has parts dendrites and axons. Dendrites collect information and bring it to the cell body. Neurotransmitters are the postmen delivering messages from one neuron to another. The axons send secret messages for the body telling the body to take action. Cells are the basic unit of life and they make up all living things.

—Fujioka Leyre, eighth grade

Students add verbs next to the drawing to describe the movements of the organism (e.g., stretch, slither). Adjectives are added alongside the nouns

to detail the image (e.g., smooth, intricate, elastic, and so on).

The second element—applying word knowledge—calls on students to use the vocabulary they have collected. Teachers help students describe, analyze, and interpret images using vocabulary developed through visualization techniques. For example, one team of sixth-grade boys interested in hot rods observed and drew an automobile motor in detail after looking under the hood of a car. Students discussed as a team the functions of the parts. They connected and related those functions to their current understanding of how cells work within the human body. They asked themselves, “What is similar? What is different? What are the signal vocabulary words to compare and contrast?” One student said, “Like the fan belts on the motor of my cherry red Nissan, the long muscle cells stretch out smoothly, waiting for communication from the brain.”

The third element—writing purposefully in cognitively rich contexts—asks students to create texts rich in academic and technical terms, reflecting a deep engagement with the concepts learned in elements one and two. They show what they know and have learned through descriptive writ-

## NSTA Reports

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NSTA Reports, published nine times a year from September through May, is NSTA's source of news and information for and about science teachers. NSTA Reports includes science education news, information on association activities, and updates on teaching materials and programs.

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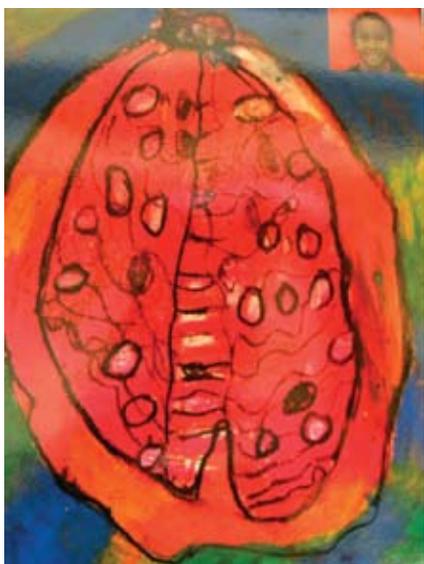
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See Phillips, page 4

Phillips, from page 3



The little white oval seeds are sleeping in a bed of brains like a old cow in bed of hay. The seeds must rest because when the pumpkin dies the seeds will go into the ground and make new pumpkins. The stem is wide and has thick lines on it. It has a hard job bringing water nutrients to the pumpkin so it can grow. The skin of the pumpkin has ribs from top to bottom. It keeps the bugs from eating it. Every part of the big pumpkin works hard to save its life.

—Shayla, first grade

ing based on their observations. They write in different genres about what they know about science concepts as connected to their image. The images and writing produced are used for an annual website or a class-produced book on cells.

Picturing Science uses these three elements successfully to teach students new vocabulary and writing skills in a way that captivates their attention and makes learning more exciting and tangible. These teaching techniques can also help diverse learners acquire vocabulary and concepts by connecting images to words in the real world.

For further information about PREL's professional development courses and technical assistance opportunities, contact Lori Phillips, director of PREL's Pacific Center for the Arts and Humanities in Education, at [phillipl@prel.org](mailto:phillipl@prel.org); call 808-441-1340; or go to [www.prel.org/picturingscience](http://www.prel.org/picturingscience). ●

# Key Strategies for Implementing STEM Initiatives

## Integrating Science and Emerging Educational Technology in the Science Classroom

- Full Day Research Dissemination Conference, March 12, 2011
- Highly focused, comprehensive forum with multiple, concurrent break-out sessions for K-12 teachers of science, administrators, and policy makers.
- **Plenary Session I:** From Silent Films to Virtual Worlds: A Historical Look at the Research on Educational Technology
- **Plenary Session II:** Where Do I Go from Here? Reflection, Discussion, and Resources

Pre-register for this ticketed event at [www.nsta.org/rdc2011](http://www.nsta.org/rdc2011).\*

\*Registration to the national conference is required.

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### It's Been Said...

The art and science of asking questions is the source of all knowledge.

—Thomas Berger, U.S. novelist

# PICTURING SCIENCE

## Photographing and Writing About Island Environments

By Lori Phillips and Kavita Rao

 What was the impact on our ancient environment when the caldera we live in erupted?" These words were written by Naomi Vaeau and Winona Lineberger to accompany the image at right.

They produced both words and images as participants in an all-day professional development workshop presented during the July 2002 Pacific Educational Conference (PEC) in American Samoa. The Picturing Science workshop trained teachers in an instructional approach that integrates students' science learning through use of language arts and digital photography. Workshop activities were geared to show teachers how to implement a two-week unit in their classrooms.

Starting with science standards, teachers develop vocabulary around key concepts like stewardship, a common concept underlying much inquiry-based science education and appropriate for all grade levels K-12. Once students discuss the concept, they create a word board that displays related vocabulary. Choosing from categories like "plants," "animals," "landforms," "geology," and "natural resources," the students work in groups to take the photographs they will use to illustrate their writing.

While use of digital cameras promotes technology literacy, disposable cameras or drawings work just as well. Once the photographs have been taken or the drawings have been made, the students work together to articulate the ideas behind the images. Referring back to the word board and the central theme, they are encouraged to write descriptively and to recreate their images in words using metaphors, analogies, and other literary devices. Teachers with bilingual learners have the option of having students write in their first languages, in English, or in both.

For more words and images, visit the Picturing Science website, a showcase of work by participating teachers and students available at [www.prel.org/picturingscience/preconference/index.html](http://www.prel.org/picturingscience/preconference/index.html). The Picturing Science approach was developed by Lori Phillips and Kavita Rao; the PEC workshop was sponsored by the Pacific Center for the Arts and Humanities in Education (PCAHE), the Pacific Mathematics and Science Regional Consortium, and the Pacific Regional Technology in Education Consortium. The workshop has also been presented in Guam, Saipan, and Hawai'i.

Capturing their images helps students take a fresh look at their environment and rethink their relationship to it. By writing about the photographs they have taken, students explore the connections between words and images and the ways in which they reinforce each other. But whatever literary technique students use, the powerful message of environmental stewardship shouts at the viewer both in image and in word.

*For more information about the project, contact PCAHE Program Director Lori Phillips at [phillipl@prel.org](mailto:phillipl@prel.org) or Pacific Mathematics and Science Consortium Instructional Design Specialist Kavita Rao at [raok@prel.org](mailto:raok@prel.org). ★*



▷ Yesterday: What was the impact on our ancient environment when the caldera we live in erupted? If we really treasure the beautiful land formations it created, we'll keep them clean. Conservation is our business!



▷ Today: Let Rain Maker Mountain own the panorama of nature. Like the flimsy man-made ship on the edge, let's stop trying to conquer Nature and become responsible stewards. Bubbling jewels of delight, the clean seawaters will salute us forever.



▷ Tomorrow: People cast a foreboding shadow on their planet and its ecology today. Let's learn to use its resources wisely or else we'll lose it all. Conservation: it affects everything and everybody everywhere.

Photos and captions: Naomi Vaeau and Winona Lineberger

## A Picturing Science Story

Kelly and Kekea have become very knowledgeable about inter tidal pools of the coastal waters of Hawaii. What they are really excited about is expressing their “expertise” on mollusks found in the waters. They have become the “mollusk experts of the class.” Kelly wishes he had scored higher on his final quiz, but he is looking forward to another shot at showing what he knows through the upcoming Picturing Science activities.

Kekea and Kelly have collected, labeled, and documented, through observational drawings, what they observed about mollusks. They call this their visual research, and they both have become highly skilled at it. Kelly thinks to himself, I can’t remember the exact name of each shell, but I **can** tell even the tiniest differences between each organism. He knows he can even identify them in the field book they found on grandpa’s shelf. On Monday, the boys borrow the classroom digital camera and document, through photographs, the nine varieties they have seen. They, of course, show multiple views of one specimen, sometimes blowing up their photos to the point of abstraction. “Sorta, like how Georgia O’Keefe looked at nature,” says Kelly!

Next, both boys create large 12x18 images of their favorite photo. Kelly shows off his realistic drawing skills but adds colors to his painting that could only be found so vibrant in an artist’s mind.

Kekea pushes his painting further...his goal is not to create another photographic image but to show a visual metaphor of the initial photo. Is this painting, a mountain, a mollusk, or a molehill?

After creating visual metaphors, the boys dive into matching their writing to their paintings. Can they write with the same enthusiastic and metaphoric color and clarity as they were able to achieve in their paintings?

Using a four step format, Kelly brainstorms a metaphor for describing his image. Then he lists the things he knows about the mollusks through his 2 weeks of science research. Finally, he adds an essential question that leaves the teacher wondering how on earth this child could ever have scored low on a science quiz about marine environments!

Once again Kelly and Kekea remind each other “It’s not how smart you are..... It’s HOW you are smart that counts!”

And here’s Kelly’s final result!

Photograph



Drawing



### Descriptive Statement

Hovering slowly over a mountain of polka dots, the cowry’s shell protects the snail like the security of a blanket. Cowries eat algae and control them from getting out of hand. The cowry has an important role in the inter tidal by keeping a leash on algae as it feeds on them. If cowries don’t show up for work, algae may take over smothering the other organisms.



Look and See:

## Using the Visual Environment as Access to Literacy

by Lori Phillips, EdD\*

July 2005

I will never forget my first reader. It was titled *Fun with John and Jean*. The first page said, “Look, look.” I was proud to be able to read these words. I loved the images of John and Jean’s adventures.



*Note.* From *Fun with John and Jean* (p. 6), by J. A. O’Brien, 1952, Chicago: Scott Foresman. Copyright 1952 by Pearson Education, Inc. Reprinted with permission.

Not until recently did I realize why the author had chosen these words for the first pages and why they were so important. Looking and seeing is a powerful way for young children to learn. Observing and talking about what they see helps children understand their world and how they fit into it.

The purpose of this paper is to describe how the visual environment—what we see when we look—can be used to develop both visual and verbal literacy, including aesthetic appreciation, comprehension, and vocabulary.

### Look and See: Aesthetic Appreciation

We know that children are natural scientists and learn from the world around them. Even more interesting is that infants and young children seem to be capable of having aesthetic experiences. When a young child holds a breadfruit and feels its bumpy skin for the first time, or delights in its color, he or she is experiencing the aesthetic. By offering toddlers opportunities to touch, see, talk about, and enjoy everyday objects, we engage them in the basics of art education. National and state arts education standards ask students not only to create art, but to also describe, discuss, and make judgments about their visual world. Teachers should hold conversations with children about what they see, introduce the elements of design, and help them make meaning of this world (Feldman, 1970).

Toddlers can express preferences for objects, colors, and certain images. When they do so, they are making judgments, or aesthetic choices. When they favor a certain crayon, or look over and over at a picture or wallpaper print, they are learning to make visual decisions about what they prefer. When teachers offer children the opportunity to make these types of judgments, they are creating the opportunity for them to hold an aesthetic discussion (Erickson, 1988).

According to White and Stoecklin (1998), studies have provided convincing evidence that people in pleasing natural environments have better information recall and creative problem solving skills. In the Pacific islands, children may have few chances to visit an art museum, however, they live with unbelievable natural beauty. They see color and learn about nature and beauty by seeing, touching, tasting, and smelling. Early experiences with the natural world have been positively linked with the development of imagination and the

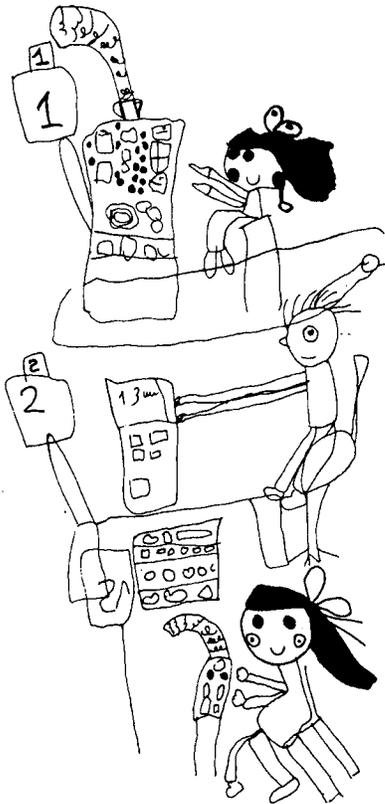
\* Lori Phillips, EdD, is the Director of PREL's Pacific Center for the Arts and Humanities in Education.

sense of wonder. Wonder is important as it is a motivator for lifelong learning. There is also strong evidence that suggests young children respond more positively to experiences in the outdoors than adults, as they have not yet adapted to unnatural, man-made, indoor environments.

### Look and See: Drawing and Comprehension

It is through both image and word that children construct meaning and understanding. Drawing enables us to visually present, in the concrete, our understanding. In their book *Picturing Writing* (1999), Hal and Michele Takenishi argue that if students are struggling in the writing process, educators should encourage them to draw an image, adding more and more detail. “Students who do not have clear details in their writing need more details in their illustrations to help them visualize what they are trying to say” (p. 6).

Drawing the visual environment enhances understanding and visual vocabulary of objects in the natural world, helping us document ideas about how things work, and clarify our understandings in a graphic language. Reggio Emilia, a unique set of early childhood schools in northern Italy, encourages children to use “graphic language” to describe their understandings (Edwards, Gandini, & Forman 1998). Children are encouraged to use drawing as a means to record their understandings of events or objects, to reconstruct previous ideas, and to predict how objects or events work. In the United States, early childhood educators have long acknowledged that children can express their understanding verbally and through



*Note.* From *The Hundred Languages of Children: The Reggio Emilia Approach—Advanced Reflections* (p. 30), by C. Edwards, L. Gandini, and G. Forman (Eds.), 1998, Westport, CT: Ablex. Copyright 1998 by Ablex Publishing. Reprinted with permission.

dramatic play. However, observations at the Reggio Emilia schools demonstrate that young children are able to construct meaning through graphic language (drawing) at a younger age and more competently than we in the United States had assumed. After a trip to the supermarket 4- and 5-year olds at one Reggio Emilia school drew this drawing of cashiers.

The children’s drawings alone would only document part of their understanding. The following are comments recorded by the teacher after the supermarket trip:

- It is as large as a forest.
- You could get lost in it, just like on the Via Emilia.
- It is as huge as the whale in Pinnocchio.

It is through both verbal and visual descriptions that we see the child’s growing knowledge and true comprehension of events.

### Look and See: Vocabulary

Aesthetic experiences can promote language development and artistic creation (Feeney & Moravcik, 1987). Talking about art, objects, or book illustrations helps build the child’s “allusionary base.” Building the allusionary base is building the image base. As children build their image base, both their language and art making skills are enhanced.

Young children also build their allusionary base by interacting with objects from the environment. Looking closely at, touching, and talking about their visual world not only prepares the child for the process of drawing, sculpting, and painting, but also for visual and verbal literacy.

Vocabulary is not just knowing individual words, but knowing the array of associations surrounding them. By having children talk about what they see, you are helping them make deeper connections. You are also helping them build their verbal associations, so when they encounter words in reading, they will have a fuller understanding, leading to better comprehension.

There is considerable research that equates low vocabulary to low comprehension (Beck, Perfetti, & McKeown, 1982). Other research shows that we learn vocabulary through association—we learn words in groups that hang together. The imaging process can increase vocabulary by making children draw wider associative networks of meaning, and can help improve reading comprehension by enforcing the concept that every word has multiple associations.

### Look and See: Comprehension

Reading comprehension relies on more than knowing the words on the page. It also depends on the associations the reader adds to the text on the page. As readers, you and I will have greater understanding of an article on “apples” than on “jack fruits” because we probably have deeper associations with apples (T. Donahue, personal communication, June 2005). In other words, the background knowledge we bring to the image or text greatly influences the depth of comprehension we are able to attain.

My colleague Rod Mauricio demonstrated this concept in one of my favorite stories in a conversation last year. Rod is from Pohnpei, an island in Micronesia. Rod introduced us to

the word *dopwolong*. He asked us to pronounce the word. All 10 of us had a difficult time. He pronounced it again and taught us the correct pronunciation. He asked us to try to spell it. We came up with many different but incorrect predictions. Then he taught us to spell it. Rod wrote “dopwolong” on the board. We all read it back, proud that we could pronounce it correctly. Rod asked us if we felt we were reading. Some felt that we needed to know the meaning of the word to really be reading. Rod told us *dopwolong* meant to wash your hair in Pohnpeian. He asked us if, now that we knew the meaning, we felt we were reading. We felt satisfied and were quite proud of our multicultural lesson. However, Rod then told us a story of *dopwolong*. It turns out *dopwolong* is not just washing your hair as perceived in the English context. The washing of hair is so important in certain medicinal ceremonies in Pohnpeian culture that it has gained its own word. Otherwise, Pohnpeian, like English, would just have the phrase *uden moangomw*, literally translated as “wash your hair.” According to Rod, this would not express the rich cultural importance of *dopwolong*. *Dopwolong* implies medicine penetrating deep into one’s skull in a ceremonial event held in Pohnpei at certain times with certain people. To fully comprehend the word *dopwolong*, one must understand the contexts and background from which the word originates. Having this conversation helped us to really read the word with deeper meaning. Were we really reading?

### Look and See: Tools for Teachers

Some research indicates that the quality of young children’s artistic and aesthetic experiences improves with adequate time, space, and some adult intervention (Bruce, 1998). What might this intervention look like? Aesthetic intervention, whether in adults or young children, requires creating an environment and process to slow down and really see. Whether looking at fine art or a beautiful leaf, the objective is the same: taking time, looking, describing, and suspending judgment (Edwards, 1979).

Teachers and parents can use simple techniques to slow down the process of seeing and promote looking, describing, analyzing, and interpreting. This is sometimes known as building an allusionary or image base. Whether it’s a McDonald’s sign, an ad on television, a painting, or a breadfruit, we are confronted with a visual message that can be read. Literacy is not just reading words, but reading our visual environment. By looking, describing, analyzing, and judging, we build our allusionary base to understand what we see and build connections to our world. By speaking, listening, writing, and reading we build our vocabulary, which leads to comprehension, and ultimately to literacy.

The following two processes can be used by many educators to slow down the visual process for looking at art. The first is for looking at images and the second is for looking at objects in the environment. These processes help the viewer to look closely and describe in words the image or object in front of him or her, suspending judgment for later.

### Making Meaning with Art

#### Step 1 Initial Response

(Ask for one word or a short statement; repeat what is said.)

- What do you think about this piece/object?
- What is your initial reaction?
- What is the first thing you thought when you saw it?

#### Step 2 Description

(Describe the art piece in front of you; pretend you’re describing it to a blind person.)

- Start with, “I see \_\_\_\_\_.”
- What else is there?
- What is it made of?
- What elements of art are used (line, shape, color, texture, value, other expressive qualities)?
- Make up a narrative or story about this piece (who might be walking in the door; what time of day it is).

#### Step 3 Analysis

- How are the “elements of art” (line, shape, color, texture, value) used in this image?
- Choose one of the elements, line, shape, color, or texture, and ask, “How it is used in this piece?”
- Where does the artist want you to look (focal point)?
- How is light used to create mood? Color?

#### Step 4 Interpretation

- What do you think the person in the painting is feeling?
- What is he or she thinking?
- What mood do you think the artist was trying to express?
- How does this piece make you feel?
- What emotion is best expressed in the piece?
- What’s going on in this piece?
- What do you think the artist was trying to express?

#### Step 5 Judgment

- How do you feel about this piece now?
- Do you feel differently than when you first saw it?
- How has your feeling for it changed? Would you like to own it?
- Would you like to see more of this artist’s work?

Using these same steps, one can use similar questions to look more closely at interesting objects within the child’s environment.

### Making Meaning with the Visual Environment

- Initial Response: What do you think? What is it?
- Description: Describe it. What does it smell like? What does it feel like?
- Analysis: Tell me about its shapes, color, and texture.
- Connection: What else is this like? What do you know about this object?
- Judgment: Would you like to find more of these objects? Have you seen anything that is the same but different?

These conversations help children observe the essence of the objects in front of them, and can improve aesthetic appreciation, vocabulary, and comprehension.

## Look and See: Making Meaning By Drawing

If one wishes to trace visual thinking in images, one must look for well-structured shapes and relation which characterize concepts and their applications. They are readily found in the work done at early levels of mental development, for example in the drawing of young children. (Arnheim, 1969, p. 255)

Children's understanding of their world and what is important to them is often best described in their drawings. By asking children to draw what they see, not what they think they see, you offer them the opportunity to slow down and really look. The following is a description of how to offer children this type of opportunity:

*Give children dark colored pencils or felt tip pens and ask them to carefully observe objects in their environment. Describe the shape and texture of each object with lines. Talk to children about using "confident lines" and visually describing using lots of detail. The role of the teacher is often only to ask, "What else do you know about this object or event?" "Show me more." "I understand the shape of your object but I'm wondering how you will show how it felt." (texture) "What else was there?" "What is missing?"*

The goal is to create drawings that demonstrate the same clarity that is often achieved in talking about an object or event. Looking and seeing, talking and drawing, and moving from image to word and word to image, all help children in language development and constructing meaning and, ultimately, improve literacy. According to Lilian Katz in *The Hundred Languages of Children*, children should be engaged in multiple ways of showing what they know in the quest for deeper understanding of the world around them (Edwards, Gandini, & Forman, 1998).

## Look and See: Children Made Materials Development

When children are offered opportunities to talk, draw, and read about their visual environment, their creative ability and their interest will peak. In the Pacific, reading materials in the vernacular are needed. Children's drawings and paintings are useful resources for creating colorful culturally appropriate materials in the first language. The *Island Alphabet Books* series, published by Pacific Resources for Education and Learning and Bess Press, uses illustrations created by Pacific children to create first language readers.

This paper has described the value of aesthetic appreciation and its connection to literacy. It has explained the relationship between vocabulary, comprehension, and learning to see. It has provided a few tools for teachers to try in their classrooms.

**"Look and see" how exciting using the visual environment in your classroom can be!**

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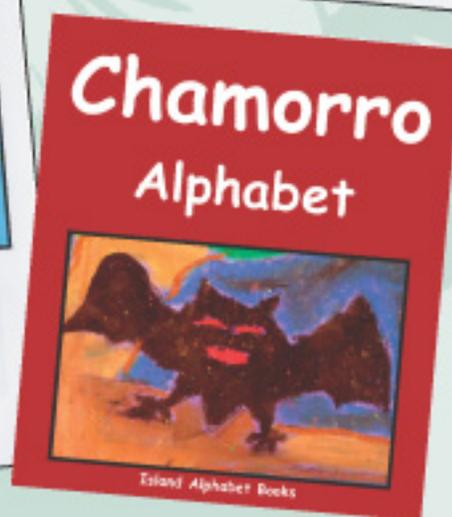
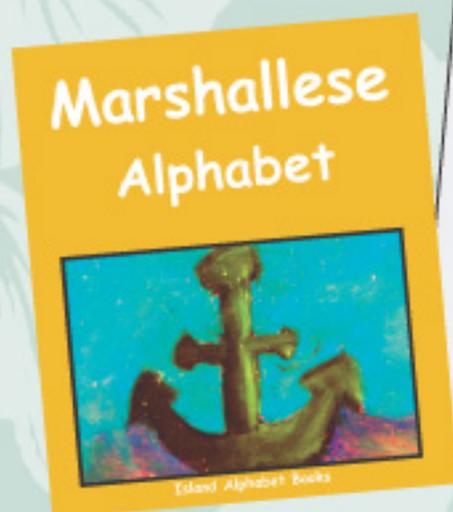
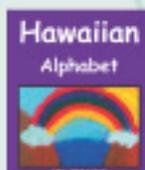
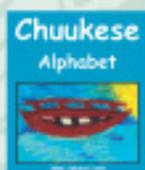
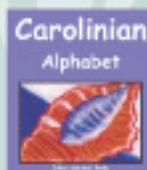
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# Island Alphabet Books



The Island Alphabet Books series features languages and children's artwork from the U.S.-affiliated Pacific. Each book contains the complete alphabet for the language, four or five examples for each letter, and a word list with English translations. The series is published by PREL, a nonprofit corporation that works collaboratively with school systems to enhance education across the Pacific.



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This product was funded by the U.S. Department of Education (U.S. ED) under the Regional Educational Laboratory program, award number ED01CO0014. The content does not necessarily reflect the views of the U.S. ED or any other agency of the U.S. government.



NATIONAL  
 ENDOWMENT  
 FOR THE ARTS

This project is supported in part by grant award no. 04-5100-8121 from the National Endowment for the Arts, which believes that a great nation deserves great art.



# Picturing Science: Goals and Methodology

Subject Area	TEACHER Goals Picturing Science provides the following for teachers:	STUDENT Goals Picturing Science activities provide ways that students can:
<b>SCIENCE</b>	<ul style="list-style-type: none"> <li>• A culminating activity to a science unit</li> <li>• Ideas on how to take science themes and develop essential questions that can be answered visually</li> </ul>	<ul style="list-style-type: none"> <li>• Express an understanding of science content with an authentic project</li> </ul>
<b>SCIENCE &amp; LANGUAGE ARTS</b>	<ul style="list-style-type: none"> <li>• Strategies that connect science and language arts skill-building</li> </ul>	<ul style="list-style-type: none"> <li>• Synthesize science content that they are learning in class and express their comprehension of that knowledge in written form</li> </ul>
<b>TECHNOLOGY &amp; VISUAL ART</b>	<ul style="list-style-type: none"> <li>• Strategies for integrating technology and art into science lessons in a way that can motivate students</li> </ul>	<ul style="list-style-type: none"> <li>• Use digital photos and visual art as ways as a personalized prompt for writing (assumption: students feel ownership of the photo they have taken or art they have drawn and are more motivated to write as a result)</li> </ul>
<b>LANGUAGE ARTS (WRITING SKILLS)</b>	<ul style="list-style-type: none"> <li>• A creative lesson plan that allows students to use science vocabulary and express science concept comprehension</li> </ul>	<ul style="list-style-type: none"> <li>• Develop persuasive writing skills (including narrative and expository writing) that connects to science knowledge gained in class</li> <li>• Develop figurative language skills (creating metaphors and similes) by using photography, art, and science knowledge as prompts</li> <li>• Respond to open-ended questions</li> </ul>

## Methodology

To integrate science, technology, art and writing for a project-based science-themed outcome, several steps scaffold on each other:

**Step 1:** Take a photo(s) that answers a science question posed by the teacher. (*The teacher will have determined these “essential questions” the students should be able to answer, having studied a particular unit. Questions should be worded carefully, allowing the student to come up with visual ‘answers.’*)

**Step 2:** Use art to engage with your photo and take further ownership; create a watercolor or pastel version of the photo you have taken.

**Step 3:** Consider how your photo answers the essential science question you started with:

- How does your photo (and art picture) answer the science question?
- What is important about your photo?
- Why did you choose to take that particular photo and what does it show?

**Step 4:** Use Image to Word strategies to isolate elements of photo/art picture.

- What nouns can you identify? What are the nouns “doing” (finding verbs)? How are the noun/verb pairs doing it (determining the beginnings of figurative and descriptive language such as metaphors and similes)?

**Step 5:** Use what they learn about figurative language and persuasive writing (give the example of National Geographic captions) to write full sentences. The leading sentence should contain figurative elements (developed in Step 4). The second and third sentences should be persuasive, answering the essential question of why the student took the picture in the first place.



# Picturing Science

## **Picturing Science**

In science and art, observation plays an important role. The more observation, facts and data collected, the closer we are to understanding our world. Man naturally brings bias to his perception of the world. (Perceptions are biased.)

By learning to use the power of observing, describing and interpreting we offer students an opportunity and process to make meaning of their environments. In both art and nature we often use a similar five step process.

## **Visual Arts - Making Meaning Process**

Initial response

Describe (same process needed as science)

Analyze

Interpret (make meaning through feelings, no one person right)

Judgment/Present

## **Scientific Process - Making Meaning**

See/Observation

Wonder/Problem (same process needed as arts)

Hypothesis

Test/Data (must be able to replicate)

Judge/Conclusion/Report

## **Five “E” learning Cycle**

Engage

Explore

Explain

Elaborate

Evaluate

# Medical students acquire artist's eye

Touch of humanities in studies helping raise observational skills

BY JOANN LOVIGLIO  
Associated Press

PHILADELPHIA — Modern medicine provides doctors with an array of sophisticated machines that collect and present data about their patients, but the human eye is an invaluable, yet often underappreciated diagnostic tool.

To address that, a new collaboration of Jefferson Medical College and the Pennsylvania Academy of the Fine Arts has been created to teach aspiring doctors to closely observe, describe and interpret the subtle details with the eye of an artist.

The art-and-medicine program kicked off its first workshop last week with a group of 18 white-coated medical students visiting the academy's museum and a dynamic representation of their chosen profession: Thomas Eakins' masterwork "The Gross Clinic," which depicts an operation in progress.

The first- and second-year med students heard how to take a "visual inventory" — paying attention to overall elements of the painting, such as texture and brightness, and specifics, such as body language and facial expressions.

"This collaboration with our art colleagues is a wonderful augmentation to what we're already doing," said Dr. Charles Pohl, a professor of pediatrics at Jefferson and co-instructor at Friday's workshop. "We can learn from the masters to really fine-tune our attention to detail."

Besides the two-hour Visual Perception workshop, others slated for the 2007-08 school year are Accuracy and Perception, Hand-Eye Coordination, Art in Healing, and Sculpture and Surgery. The courses are a mix of demonstrations, lectures and hands-on art lessons.

A 2001 study in the Journal of the American Medical Association found that medical students in a similar Yale University program acquired more astute observational skills than their colleagues who didn't take the courses. Besides assessing a patient's well-being during an office visit, finely honed visual abilities also can allow doctors to spot subtle changes in a patient's X-rays over time, for example.

"When they can take a better look at the person in front of them, it helps them make better diagnoses and leads to improved sensitivity to the patient," said the academy's painting department chair, Al Gury, workshop co-instructor. "That's a critical area that many feel is needed in the medical profession."

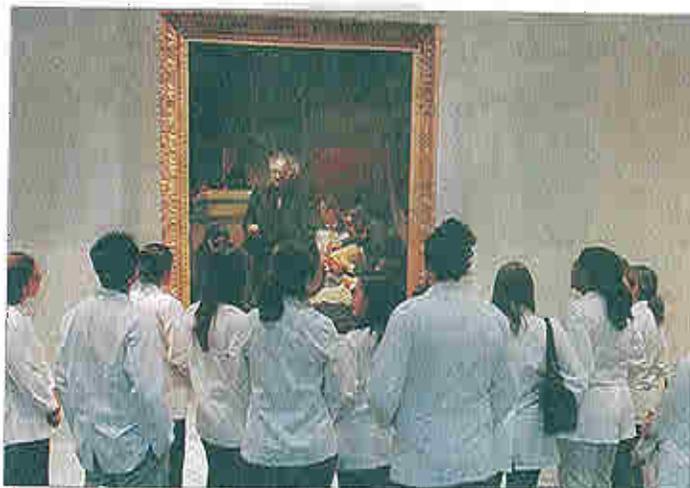
Medical schools nationwide are increasingly adding humanities courses to their curricula.

According to the Association of American Medical Colleges, 89 of the country's 125 medical schools have humanities as an educational element included in a required course and 66 have it as an elective. (There's overlap because some schools have both.) The figures include all humanities, not just visual arts, spokeswoman Nicole Buckley said. Other humanities studied in medical schools include literature, performing arts and music.

The Medical College of Wisconsin has a one-month medical humanities elective for fourth-year medical students, and Weill Cornell Medical College in New York City established a program in conjunction with the Frick Museum.

While fine art may be unexplored territory for some Jefferson medical students, many of their artistic contemporaries at the academy are no strangers to the world of science.

"Our students go to the gross anatomy labs in their upper-level anatomy study," Gury said. "But this is the first time we've hosted the medical students."



MATT ROURKE | Associated Press

Jefferson Medical College students learn from Thomas Eakins' "The Gross Clinic" at the Pennsylvania Academy of the Fine Arts.



# Making Meaning with Art

## Step 1 Your initial Response

(Ask for a one word or short phrase statement; repeat what is said.)

- What do you think about this piece?
- What is your initial reaction?
- What was the first thing you thought when you saw it?

## Step 2 Description

(Describe the art piece in front of you; pretend you're describing it to a blind person.)

- Start with, "I see \_\_\_\_\_"
- What else is there?
- What is it made of?
- What elements of art are used (line, shape, color, texture, value, other expressive qualities)?
- Make a narrative or story about this piece (who might be walking in the door; what time of day is it?).

## Step 3 Analysis

- How are the elements of art used in the final piece (line, shape, color, texture, value)?
- Choose line, shape, color, value or texture and ask, "How is it used in the piece?"
- Where does the artist want you to look (focal point)?

## Step 4 Interpretation

- What do you think **the person** in the painting is feeling?
- What is he/she thinking?
- What mood do you think **the artist** is trying to express?
- How does this piece make **you** feel?
- What emotion is best expressed in the piece?
- What's going on in this piece?
- What do you think the artist was trying to express and was he successful?

## Step 5 Judgment

- How do you feel about this piece now?
- Do you feel differently than when you first saw it?
- How has your feeling for it changed?
- Would you like to own it?
- Would you like to see more of this artist's work?



# Picturing Science

## Photojournalism Unit

**Goals:** Students look at their environment through new perspectives using digital photography and art. Combining scientific fact about environmental factors (organisms, geographical features, natural or manmade processes), students “market” the need for conservation and stewardship.

**Grade Levels:** 5-10 (modify writing activities as appropriate)

Science Themes	Writing Styles	Visual Arts	Technology
Determining important geographical features or organisms (depending on theme of project)	Scientific Writing	Composing Photographs	Use of digital cameras
Diversity of Life on the planet	Adding creative elements to writing	Drawing Pictures (optional)	Use of Word Processor
Interconnectedness of life	Utilizing figures of speech (such as metaphor)		Use of Web to share projects

### Before: Preparation for Project

- 1) Develop science concepts prior to project.
- 2) As part of a science unit, examine a theme. It is useful to have gone over the scientific terminology and vocabulary of the concepts being studied.
- 3) Use the attached *Essential Questions and Science Standards* sheet for ideas on questions students can address in this project.
- 4) Create a Word Board to develop vocabulary and brainstorm key terms and ideas.

### During: Taking pictures

- 5) Students are grouped and assigned to take three pictures of their chosen element (organism, environmental feature, etc).
- 6) Each group photographs its chosen objects/element using three perspectives:
  - a) Wide Shot - “The Bigger Picture”
  - b) Close up to the “Point of Abstraction”
  - c) Partial shot of one characteristic taken from a creative perspective or unique angle
- 7) Show students examples of how a photojournalist takes pictures. Use National Geographic or other such magazines that combine journalism and photography with science-themed articles.

### During: Art Activities (Optional)

- 8) Adding a visual arts element to this unit allows the students to examine their photos from a creative perspective.
- 9) Using construction paper and oil pastels, have students draw an object from their pictures.



### **During: Writing Activities**

- 10) Pick a few well-written captions in the magazine you used. Find captions that have a “hook” that draws the reader in. A well-written caption is often written with an artistic hook and followed by scientific fact. Show these pictures to the class, read the captions out aloud and have students discuss the elements of the caption. What kind of vocabulary is used? What did you learn about the picture? What drew you into the caption? Discuss how metaphors are used in these captions.
- 11) On a blank sheet of paper, have students “loosen up their brain.” Get them to put the name of their theme (or organism or feature) in the middle and then do a free form word association. Encourage them to be creative about this.
- 12) Now have students pick one of their three pictures (if each student in the group would like to do a different picture, that will also work well). Use the “Pulling Words from Images: Nouns and Verbs and Descriptive Words worksheets to
- 13) On another sheet of paper, have students write metaphors about their chosen picture. What is their picture like? Encourage them to use metaphors that are creative referring them to the descriptive words they came up with. Make sure the metaphor “grabs” the audience with an interesting, creative or descriptive statement.
- 14) Flip that piece of paper over. Students should draw lines to split the paper into three parts. On the top, they should write the metaphor they want to use to begin their caption. In the middle, they should write one or two sentences stating a scientific fact about their picture. On the bottom third, they should write a closing statement. They can add a few closing sentences if they would like.
- 15) By stringing together these sentences, the student will have written his/her ‘caption’. If the students are doing this activity on a computer, have them insert their picture in a blank document and write their caption under it. If the students do not have access to a computer, they can write their captions on paper and paste their pictures above (if the pictures can be printed out.)

### **After: Sharing the Project**

- 1) Student’s digital pictures and related art are showcased
- 2) Digital pictures, art and words can be put on a Website

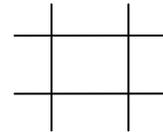
# Digital Photography Techniques

## Getting Started

1. *Holding the camera* – wrap strap around fingers, hold solid, use viewfinder, watch fingers
2. *Focusing* – depress the shutter button half-way and then press completely – hold your breath, press button and then release breath (or do the opposite), use a tripod (a lamp stand can be a tripod) or support your body, elbows close to ribs
3. *Preview* – use the preview feature to check your shots

## Composition

1. *Keep it simple* – zoom in on subject or get close, avoid clutter
2. *Rule of 1/3s* – put horizon on horizontal line and subject at intersection of vertical and horizontal lines
3. *Lines and shapes* – look for interesting lines and shapes and work with them, change your angle, move off center
4. *Vantage point* – lower positioning = significance, grandeur while higher positioning decreases significance of subject
5. *Balance* – make sure that dominant objects complement the subject either symmetrically or asymmetrically (more interesting)
6. *Framing* – look for opportunities to frame your subject (i.e., tree branches, windows, etc.), adds depth to your picture
7. *Lighting* – make sure that the sun is behind you, can change modes on your camera to work with lighting, can turn on flash for sunny portraits and the flash will provide full light to eliminate shadows, a flash has a distance of 8-10 feet, if your subject is farther away turn off the flash
8. *Zooming* – optical and digital zoom, optical magnifies the image as light comes in and digital does it after the fact, with zooming you have more potential for blurriness and shake camera



<http://digitalphotography.tipcentral.net> and <http://digital-photography-school.com>

Top 10 Questions to Ask	Top 10 Tips
<ol style="list-style-type: none"> <li>1. What story am I telling?</li> <li>2. What is the visual focal point of this shot?</li> <li>3. What competing focal points are there?</li> <li>4. What is in the background and the foreground?</li> <li>5. Am I close enough?</li> <li>6. What is the main source of light?</li> <li>7. Is my framing straight?</li> <li>8. What other perspectives could I capture from this?</li> <li>9. How would holding the camera in the other format change this shot?</li> <li>10. How will the eye travel through this image?</li> </ol> <p><a href="http://digital-photography-school.com/10_questions">http://digital-photography-school.com/10_questions</a></p>	<ol style="list-style-type: none"> <li>1. Take a lot of shots.</li> <li>2. Half press the shutter to eliminate shutter lag.</li> <li>3. Get close – fill the frame.</li> <li>4. Don't buy into the megapixel myth.</li> <li>5. To get a blurred background, back up and zoom in.</li> <li>6. Turn off the flash when possible.</li> <li>7. Turn on the flash for sunny outdoor portraits – provides full light.</li> <li>8. No tripod – improvise.</li> <li>9. Use self-timer when sharpness counts.</li> <li>10. Exploit the “magic hour” – 1 hour before sunset and 1 hour after sunset – “sweet light”</li> </ol> <p><a href="http://fyi.oreilly.com">http://fyi.oreilly.com</a> – David Pogue</p>



# Essential and Foundation Questions

## What is an Essential Question?

Essential Questions are questions that encourage students to go beyond collecting information and start putting information to use as critical thinkers. They promote analytical and creative thinking. There is a difference between **knowledge** and **understanding**. Essential Questions promote inquiry-based learning asking students to take the facts that they learn and synthesize information to ponder a larger question.

"The answer to the essential question will require that students craft a response that involves knowledge construction. This new knowledge building occurs through the integration of discrete pieces of information obtained during the lesson. As a result, answers to essential questions are a direct measure of student understanding."

-*Trivial Pursuit to Essential Questions* <http://www.fno.org/feb01/pl.html>

## What is a Foundation Question?

A **foundation** question is one whose answer provides the facts used to answer the essential question.

Foundation questions are typically the "What is" questions. They will be the questions you will try and get answers for. The facts obtained by finding the answers to your foundation questions will be used to build the answer to your essential question.

## CHARACTERISTICS OF THE TWO TYPES OF QUESTIONS

(<http://www.biopoint.com/ibr/askquestion.html>)

Essential Question	Foundation Question
Requires the student to: <ul style="list-style-type: none"> <li>○ Develop a Plan of Action</li> <li>○ Make a Decision</li> </ul>	<ul style="list-style-type: none"> <li>○ Typically "what is..." format</li> <li>○ Provides factual information that is used to build the answer to the essential question</li> <li>○ Helps identify what you need to know to answer the foundation question</li> <li>○ Helps develop a keyword list for Internet searching</li> </ul>

## Science Theme/Topic Wetlands

(Remember: Essential Questions require decision-making and synthesis of information.)

<b>Essential Questions:</b> Should wetlands in the United States be preserved?	Here are some <b>Foundation Questions</b> relating to the wetlands essential questions: <ul style="list-style-type: none"> <li>● What is a wetland?</li> <li>● What are the reasons for saving wetlands?</li> <li>● Why are wetlands being destroyed?</li> <li>● Who is destroying wetlands?</li> <li>● How many of acres of wetlands exist in the United States?</li> <li>● At what rate are wetlands being destroyed?</li> <li>● What are the best methods for saving wetlands?</li> </ul>
---	--



**Science Theme/Topic** you teach \_\_\_\_\_

Make a list of **3 Essential Questions (EQ)** that you want students to explore when they learn about this topic:

EQ#1.

EQ#2.

EQ#3.

	List 3-5 <b>FOUNDATION QUESTIONS</b> for each Essential Questions you wrote above.
EQ #1	
EQ #2	
EQ #3	

If you do a search of the Web for information on the topic, the foundation questions can provide **KEY WORDS** for your search. Circle the potential keywords in your foundation questions.

### Essential Questions and Science Standards

The titles of the themes are chosen to be evocative of visual approaches to the science questions.

To make science connection explicit, this activity needs to be preceded by a discussion led by the teacher on whatever themes or essential questions he/she will use.

Themes:	Essential Questions	Science Standards Addressed
<b>Island Environments: From Mountain to the Sea</b>	Take pictures that show the key geographical features of your island. a) mountains b) ocean c) mangroves	<u>K-8 The Planet Earth: Oceans and Land</u> Describe the formation of their own Pacific environment.
	Take pictures of plants or organisms that are unique to the ocean environment on your island.	<u>K-8 The Planet Earth</u> The relationship and importance of plants to land surfaces especially the protection of the soil.
	Take pictures of plants or organisms that are unique to the mountain environment of your island.	<u>K-8 The Planet Earth</u> The relationship and importance of plants to land surfaces especially the protection of the soil.
	Show ways in which people actively work to protect their environment.	<u>K-8 Stewardship</u> Habitats, health and happiness of people depend upon the environment. People are responsible for the conservation, protection, and management of natural resources
	Show ways in which people use parts of their natural environment for their own uses. a) Huts for canoes b) Tapa c) Woven mats	<u>K-8 The Living Environment – Interdependence of Life</u> <u>K-8 Nature of Technology</u>

	<p>Show examples of “local” technology Needs to be preceded by a definition of what technology is.</p> <ul style="list-style-type: none"> <li>a) canoes</li> <li>b) locally-crafted building tools</li> </ul>	<p><u>K-8 Nature of Technolgy</u> Traditional Pacific island examples of engineering that demonstrate low environmental impact and living in harmony with island ecosystems.</p>
<b>Our Natural World</b>	<p>Show the effects of weather (rain, wind, etc) on the environment around you.</p> <ul style="list-style-type: none"> <li>a) Things rusted by rain</li> <li>b) Example of eroded area</li> </ul>	<p><u>K-8 The Planet Earth: Oceans and Land</u> By understanding how Earth interacts with other objects in space, students develop an appreciation of the natural forces and processes that affect all life and phenomena on the planet.</p>
	<p>Show how tides affect the island.</p>	<p><u>K-8 The Planet Earth: Motions of the Earth</u> The moon’s motion relative the Earth’s motion causes tides. Students should also know local cultural knowledge relating to moon phases and tides and how they influence island life.</p>
	<p>Show food sources in our natural world</p> <ul style="list-style-type: none"> <li>a) fish</li> <li>b) taro</li> <li>c) coconut</li> <li>d) breadfruit</li> <li>e) pigs</li> </ul>	<p><u>K-8 The Living Environment: Diversity of Life</u> All organisms, including humans, are part of and depend on two main interconnected global food webs. One includes microscopic ocean plants, the animals that feed on them, and finally the animals that feed on those animals. The other web includes land plants, the animals that feed on them, and so forth.</p>
<b>Patterns and Structures</b>	<p>Take picture that show patterns that occur in nature. (<i>This needs to be preceded by a discussion on patterns.</i>)</p> <ul style="list-style-type: none"> <li>a) Patterns on leaves</li> <li>b) Patterns on insects, living creatures</li> </ul>	<p><u>K-8 Scientific Connections</u></p>
	<p>Show examples of how modern technologies have allowed us to create structures that impact our environment.</p> <ul style="list-style-type: none"> <li>a) airport</li> <li>b) buildings</li> <li>c) cars</li> </ul>	<p><u>K-8 Nature of Technology: Design and Systems</u></p>



## **VOCABULARY DEVELOPMENT**

### **3. Mind-Sketching**

#### **What is it?**

Mind-sketching is representing the meaning of a word in pictures. The brain has an amazing ability to construct and retain images. In one study, subjects were shown over 10,000 pictures. Later, when shown some of these same pictures mixed with new ones, they were able to identify the ones they had seen before with 90% accuracy. It is possible to increase understanding and retention of vocabulary words by having students sketch the meaning of each word. The brain loves pictures and remembers them more easily than words (Sorgen and Wolfe, 1994). When a student sketches the meaning of a word, she is processing at a high cognitive level of thinking and understanding. For example, if someone were asked to sketch the meaning of *hot*, he might draw a cup of coffee; this allows him to pull from his experience and add personal meaning. What else could be sketched for *hot*?

#### **How to use it.**

1. Select the content concept(s) to be learned.
2. Determine the vocabulary words that promote understanding and application of the concept(s) to be learned.
3. Provide the learners with an overview of the content to be learned, highlighting the concept(s) and the critical vocabulary words.
4. Organize teams of students and assign each member a few vocabulary words.
5. Each student works individually with her words to do the following:
  - Write each word.
  - Look up each major word in a dictionary or textbook glossary.
  - Read the definition.
  - Make a sketch that represents the definition of each major word.
  - Determine how to share the meaning of each word using the sketch with team members.
6. Team members share their words by doing the following:
  - Share each sketch, along with the meaning and the word it represents.
  - Look up the word again in a dictionary or textbook glossary.
  - Read the definition aloud.
  - Examine the sketch and discuss the meaning it represents.
  - Change the sketch if necessary.
  - Create an “essence” phrase for each word.

ADJECTIVES/DESCRIPTIVE  
ADVERBS

"MEDUSAE" = BODY SHAPED UMBRELLA  
JELLY FISH SUB UMBRELLA HAS TENTACLES

SHINY  
TRANSLUCENT  
CLEAR  
DISK LIKE  
SLIPPERY

RIBS

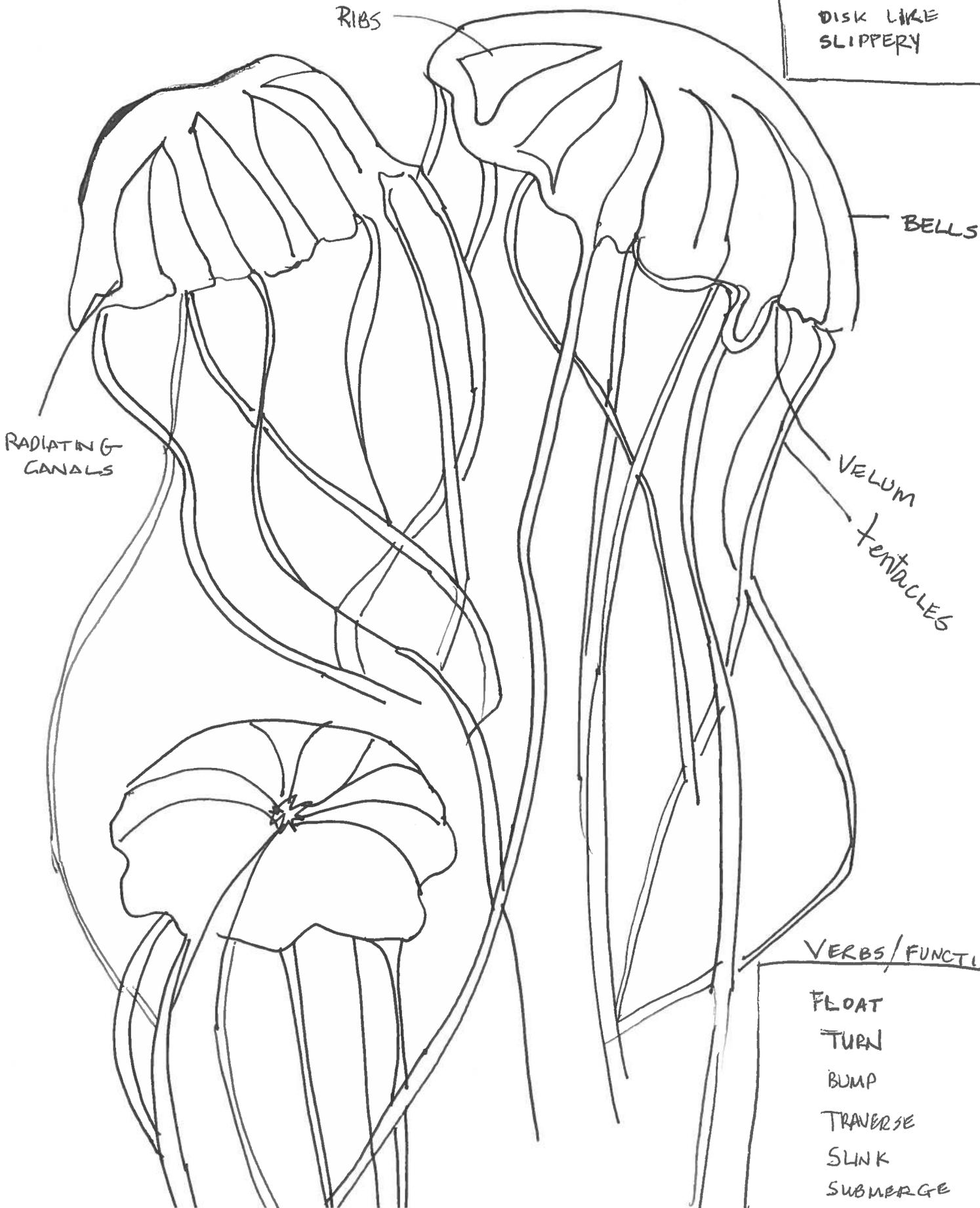
BELLS

RADIATING  
CANALS

VELUM  
TENTACLES

VERBS/FUNCTIONS:

FLOAT  
TURN  
BUMP  
TRAVERSE  
SLINK  
SUBMERGE





Draw your observational sketch here.

Noun \_\_\_\_\_

Adjective \_\_\_\_\_

Verb \_\_\_\_\_

Noun \_\_\_\_\_

Adjective \_\_\_\_\_

Verb \_\_\_\_\_

Noun \_\_\_\_\_

Adjective \_\_\_\_\_

Verb \_\_\_\_\_



## Art Tips

Use Oil Pastels or chalk

Use Construction Paper

- 1) Run off the page on all four sides
- 2) There should be no paper showing
- 3) There should be at least two colors in each area
- 4) “Local Color” Is the main color of the object being drawn. Blend other colors into local color.
- 5) Put down the colors “heavily” (press down on paper with pastels)
- 6) Blend colors only where they “kiss”
- 7) Fill it all in!!!
- 8) After completing the blended colors, add broken color on top. Broken color captures textures and characteristics.
- 9) End with a streak of unexpected color.

# Oil Pastels

- Great for classroom because:
  - \* Cheap
  - \* Add oil and they turn to paint
  - \* Teach color mixing, without paint
  - \* One color underneath another allows etch
  - \* Paint thinner on brush turns it to the look of watercolor
  - \* Resist: Use oil pastels as contour line will resist water color

After color is covering paper and blended, some drawings will need to be re-outlined with black or white oil pastel to bring out the animal or object. (Older children do not need to do this.) Finally – texture, feathers, fur can be drawn on top of painting for interest.

## Steps

- Demonstrate placing 2 colors next to each other. Place oil on one finger and rub “where the colors kiss” (where they touch each other)
- Children need to learn how to blend color for (K-2) I set the criteria of 2 colors in every section (grades 3-6) use at least 3 colors in each section. (You will continually have to remind children that they must use more than 2 colors.)
- Children need to press hard, so no paper shows through at all. The thicker the oil pastel the more “painterly” the end result will be. When you add oil it should move (blend) pastels like face make-up.
- Keep black drawing contour lines as clean as possible.
- Every inch of paper and background must be covered. Children will tell they are finished 1000 times... Your job is to point out where the paper is still showing.

# Chalk Pastels

## TIPS AND IDEAS

- \* Cheap material
- \* Do not mix color chalk and colored chalk pastels together – oil pastels are brighter but more expensive. I use pro-art pastels...student grade (at C2F of NASCO)
- \* Chalk pastels are very quick, much faster than working with oil pastels.
- \* Some teachers feel they are messy...tell children not to blow powder.
- \* Set final drawings with Aqua Net hairspray.

## STEP-BY-STEP INSTRUCTIONS

- Complete a drawing of contour line object (big...touching 2 sides of paper). You can use chalk to draw instead of black pen.
- Demonstrate how to use 2 colors in every section. K-3 2 colors; 3-6 at least 3 colors
- Blended colors: Blend colors only where “they kiss” (where they meet). Keep both colors clean.
- Cover the total page...no paper can show – background must be covered.
- When blended color is completed add broken color. Broken color is texture and lines added to the top of the blended color to add interest texture or contour lines. It is not blended...leave lines and texture sharing! Sits on top!



**Picturing Science**  
**Writing Science With Style**

Write a “Hook Sentence” or sentences here...Use a metaphor or a rich descriptive sentence. “GRAB UM”

1. Fact one. Write science fact or answer a foundational question here.

2. Fact two.

3. Fact three.

Answer or ask an essential science question here. SO WHAT? WHY SHOULD I CARE?



The golden rings that circle the Padaung woman's neck cause an aesthetic conflict as difficult to understand as the politics of ancient Burma. (CREATIVE HOOK SENTENCE)

The women of the hilltop tribes of Northern Thailand strive to lengthen their necks with brass rings to create the ultimate of female beauty. Each ring is added one by one starting at about 5 or 6 years old. Scientists say that this elongation is a myth. An orthopedic surgeon will tell you that this would lead to paralysis or death. In fact the appearance of a longer neck is a visual illusion. The weight of the rings push down the collar bone, as well as the upper ribs, so that the collar bone actually appears to be a part of the neck! (SCIENCE FACTS)

There are many different accounts of why the Padaung practice this custom. Their own mythology explains that it is done to prevent tigers from biting them. Others have reported that it is done to make the women unattractive so they are less likely to be captured by slave traders. The most common explanation, though, is the opposite of this - that an extra-long neck is considered a sign of great beauty and wealth and that it will attract a better husband. Adultery, though, is said to be punished by removal of the rings. In this case, since the neck muscles will have been severely weakened by years of not supporting the neck, a woman must spend the rest of her life lying down. According to Paul and Elaine Lewis in *Peoples of The Golden Triangle*, adultery and divorce among all Karen groups is extremely low. (CULTURAL FACTS)

Whatever the origin of the custom, one of the more common reasons it continues today, particularly in Thailand, is tourism. Although the Padaung have migrated to Thailand from Burma in only the last ten year), they have become the most popular "attraction" for hill-tribe trekking tourists. Many believe this as exploitation. This amazing custom creates both ethical and aesthetic questions about beauty, exploitation, authentic tourism and our own take on how we see our world.....What do you do in the name of beauty? What and who defines beauty among your people? (ESSENTIAL QUESTION)

# Picturing Science



Write about your picture.

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**Picturing Science  
Lesson Plan Format**

**Title:**

**Benchmark:**

**Content Objectives:**

**Language Objectives:**

**Key Vocabulary Words:**

Science : survival, stem, skin, pulp

Language: directional words (under, right, left, inside, outside)

**Activities:**



### **Show Not Tell**

**Title: Pumpkin Time**

**Grade: 1**

**Time: 60 minutes**

**Lesson Overview:** Students will observe an entire pumpkin, then observe the pumpkin cut, and lastly draw the pumpkin.

### **Benchmark SC.1.4.1**

Describe how living things have structures that help them to survive.

### **Content Objective**

The objective is to look at a drawing of a pumpkin and label the parts and tell how those parts help the pumpkin survive or stay alive.

### **Language Objective**

Students will be able to name the part of the pumpkin that his/her partner shows/points to AND use “because” to tell “why” the part is important to the plant to survive.

I will provide the students with a sentence frame “The pumpkin has a \_\_\_\_\_ because \_\_\_\_\_.”

**Classroom Set Up:** We will start on the carpet and move to desks to start the art work.

### **Materials & Equipment needed:**

- Pumpkin
- Knife
- Paper
- Cray pas
- Oil
- White board
- Expo pens
- Sharpie

**Prior to this lesson,** students already learned the parts of a plant. They also had previous art lessons to familiarize them with drawing and cray pas.



# Minutes	Procedure	Create	Respond
10	<p><b>Part 1: Observe the outside of the pumpkin</b></p> <p><i>“Today we’re going to look at this pumpkin and see if we can name the parts of the pumpkin.”</i></p> <p><u>Key vocabulary I am looking for:</u></p> <p><b>Skin-</b> The thin, shiny, orange outer layer of a pumpkin is called the skin</p> <p><b>Ribs-</b> Look at the outside of a pumpkin</p> <p><b>Stem-</b> Located on the very top of the pumpkin</p> <p><b>Tendrils-</b> Sometimes attached to the stem are thin, hairlike "tendrils"</p>		✓
15	<p><b>Part 2: Cut and observe the inside of the pumpkin</b></p> <p><i>“Now let’s see what is inside the pumpkin.”</i></p> <p><u>Key vocabulary I am looking for:</u></p> <p><b>Seeds-</b> Seeds are the beginning of next year’s pumpkins</p> <p><b>Pulp-</b> Also called "meat"</p> <p><b>Brains-</b> Okay, the proper name is fibrous strands. But, just about everyone calls them "brains"</p>		✓
15	<p><b>Part 3: Draw the pumpkin</b></p> <p>Art Activity</p> <p>Let’s observe the pumpkin again. We are going to draw the pumpkin using our sharpie. We want it to be as realistic (life like) as possible.</p> <p>Don’t forget to look at how thick the “pulp” is. What do you notice about the seeds?</p> <p>Now that we have observed our pumpkin we will draw them.</p>	✓	



15	<p><b>Part 4: Label the parts of the pumpkin and tell how those parts help the pumpkin survive.</b></p> <p>Review the parts of the pumpkin and what those parts do. Then give the handout for them to do independently.</p>		✓
5	<p><b>Closing reflection with students:</b></p>	✓	✓

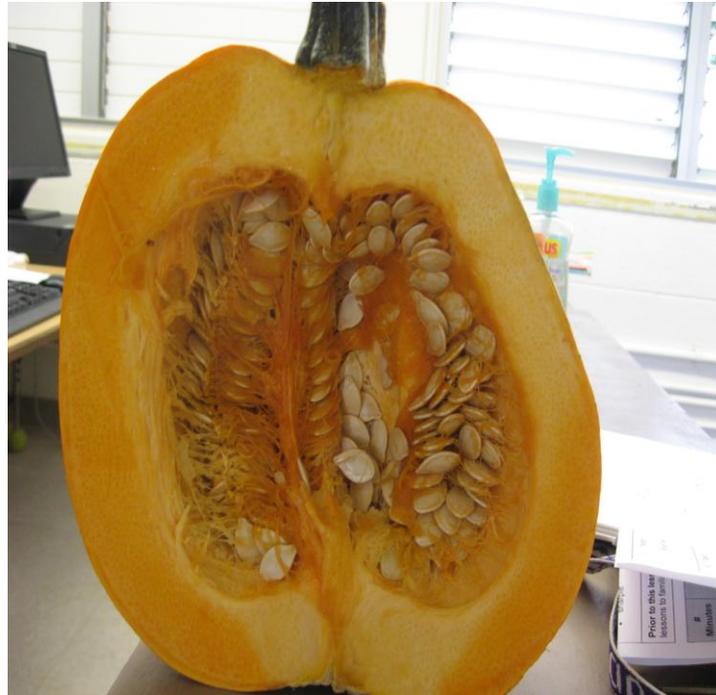
#

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**Benchmark SC.1.4.1** Describe how living things have structures that help them to survive

Directions:

Label the parts (structure) of the pumpkin by drawing a line from the part and naming it.



Can you tell me how those parts help the pumpkin survive?

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ME	MP	DP	WB
Named all 5 parts of the pumpkin AND clearly and accurately described how one of the parts help the pumpkin survive.	Named 4 parts of the pumpkin AND described how one of the parts help the pumpkin survive.	Named 3 parts of the pumpkin.	Named 2 or less parts of the pumpkin.

#

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Painting a Picture with Words



### Group 1

The lazy lemon shaped seeds are taking a nap like an old man in a care home.  
(adjective -describes the noun)      (verb- shows action)      (simile- uses like or as)

### Group 2

The lemon shaped seeds are sleeping in a bed of brains like a tired person sleeps in a bed.  
(adjective -describes the noun)      (verb- shows action)      (simile- uses like or as)

### Group 3

The lemon shaped seeds are playing hide-and-seek like children playing in a dark park.  
(adjective -describes the noun)      (verb- shows action)      (simile- uses like or as)

## My picture with words

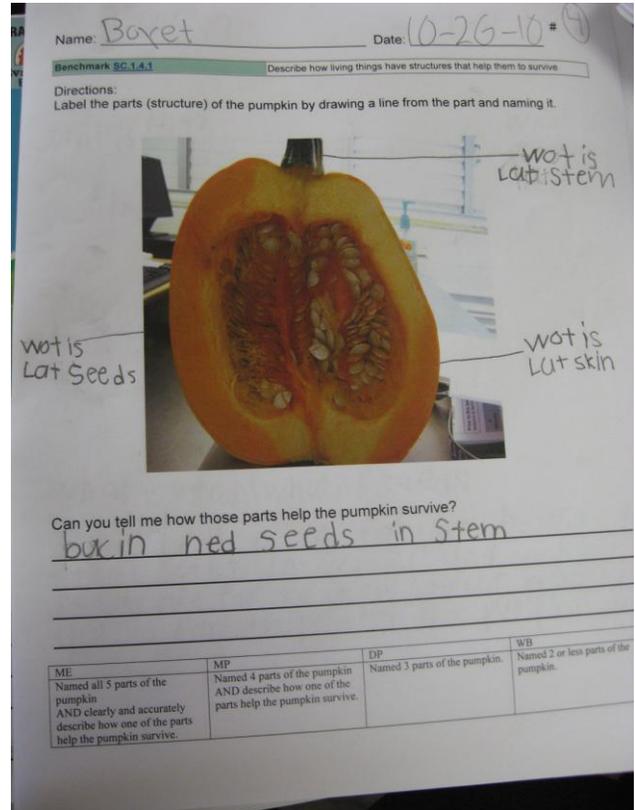
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This student only speaks a few words in English. I worked 1 on 1 with him and made him flash cards. He was able to name 3 of the 5 parts.



This is Kevin who you had a chance to see in class. He was able to name all 5 parts and spell them correctly!!! He was able to tell me that the stem helps it get water and nutrients. What I was looking for was the stem brings the pumpkin water and nutrients to help it survive.

