Rocks and Rhymes!

A geoscience activity combining field notes and poetry

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"Study the science of art. Study the art of science. Develop your senses—especially learn how to see. Realize that everything connects to everything else."

—Leonardo da Vinci (Adair 2007, p. 99)

Current research encourages science teachers to connect new learning with prior knowledge, student interests, cultural experiences, and classroom activities across disciplines (Donovan and Bransford 2005; Bransford, Brown, and Cocking 2000). Field-note poetry is the product of our efforts to combine current research in learning and cognition with integrated geoscience and language arts activities. In this article, we present a fun and effective instructional activity that teaches students how to record detailed field notes and sensory observations that become the framework and inspiration for poetry.

Looking at the world: Observation

Making observations is an important science-process skill, and gathering evidence from observations is a key element of inquiry (NRC 2000). The National Science Education Standards state that when direct experimentation is not possible, "it is important to maintain the spirit of inquiry by focusing the teaching on questions that can be answered . . .using observational data" (NRC 2000, p. 189). Because many geoscience concepts are not accessible via experimentation, geoscientists value observational evidence. As a result, students must move beyond simply looking at objects and learn to make high-quality observations. In observation activities, this transition occurs when teachers begin a lesson with basic tasks and gradually include more complex visualization tasks in combination with open-ended questions and qualitative expressions.

Journaling in nature

Recordkeeping is a fundamental element of scientific investigations, and scientists use field notes to record their observations while working outside. Field notes can range in style from structured to free form, and they should include the date, time, weather conditions, and location in each entry. They also frequently include lists of observations, measurements, and sketches.

The field-note poetry exercise in this article uses semi-structured field-note entries and can be used in any outside location that supports instruction, such as a pond, field, local park, or flower garden.

Scaffolding observation opportunities

The art of observation begins when we immerse ourselves in the surrounding textures and tones of life (Dunleavy 2008). Observational skills improve with practice, and teachers should strive to provide students with opportunities to make observations. We start with a familiar locale for students: our school grounds. Students begin the field-note poetry activity by recording basic information in their field notes—such as site location, date, time of day, temperature, and weather conditions—and noting anything unusual.

Next, we ask students to describe the topography, types and distribution of vegetation, location and types of water sources, and the flow rates and quantity of water. We also ask them to note the

- location and types of human influences;
- location, types, and interactions of wildlife;
- evidence of wildlife (e.g., prints, scat); and
- types of rocks and evidence of their weathering and erosion.

Students then draw a "T" chart in their notebooks. One side of this chart is labeled "What I see" and the other is labeled "What I hear" (Figure 1). We give students 5–10 minutes to record their visual observations and another 5–10 minutes to record their auditory observations.

Beginning with a well-known location highlights the difference between a casual glance and scientific observations. Students are generally surprised by the details they notice when given an opportunity to study a place that they encounter daily. After this experience on campus, students are better prepared to make observations off school grounds.

When students are given structured opportunities that allow them to observe nature and record their findings, their perceptions evolve and change. Following several observation activities, one student said:

> The ability to see and feel the geology of the natural world has changed the way that I look at landforms. When I see a mountain range, I now think of the millions of years of plate collisions that formed the chain and the millions of years necessary to completely erode the mountains.

Sketching in nature

As Barrett Klien, a preparer and display maker in the Exhibition Department at the American Museum of Natural History, said:

> The best way for any scientist to understand his or her science is through visualization…Close observation is the first step in any scientific inquiry, and to my mind, there is no better way to observe than to try to draw what you are looking at (AMNH 2001).

FIGURE 1
Sample "T" chart.

What I see	What I hear
Flowing river	Flowing water
People	Wind blowing leaves
Leaves blowing	Rocks being stepped on
The Sun	Birds chirping
A water snake	Cars moving (traffic)
Mountains	People talking
Columnar basalt	Leaves rustling
Dirt	
Rocks and pebbles	
Clouds	
Blue sky	
Bugs	
Grass	
Weeds	

Scientists use field sketches to enhance their observations and to develop ideas about the processes that have shaped the environment—we encourage our students to do the same in this activity. After they have completed their T charts, they sketch their observations. For example, one student may draw a broad landscape picture showing his or her position within the setting, and another may draw a rock or a plant. Sketching exercises should allow sufficient time for students to concentrate on and interpret their surroundings without input from other sources, such as their textbooks, teacher, or peers.

Once students have completed their individual sketches, they choose their own small groups and work with their group members to compare notes and produce a consolidated description and sketch. We have found this produces more detailed site descriptions and makes students aware of details they may have failed to observe individually.

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We then ask student groups to explain their drawings in a class discussion. We like to have individual students explain what they have observed through their sketches. Continually asking students broad questions—such as, What processes have contributed to this landscape? What patterns do you see? Are there relationships between the distribution of the rocks, soils, and plants?—forces them to carefully observe their surroundings and look for evidence to answer these questions.

After grading the groups' site descriptions, we provide students with anonymous examples that illustrate novice- and expert-level observations. We then ask them to compare and contrast the two examples—further reinforcing the skills needed to produce high-quality work.

Writing poetry

Once students have made their observations, created a journal entry, and drawn their field sketches, they then construct poems using these various pieces. Because there are many styles of poetry and different types of poetic structures, we discuss acceptable parameters before beginning our field-note poetry assignment. Figure 2, "Poetry 101," contains a list of common poetry styles that may be used to support field-note poetry activities. Student poems do not have to include large words or

FIGURE 2

Poetry 101 (Ghare 2007; Poetry Magic 2009).

Poetic structure	Description
Acrostic poetry	A form of short verse constructed so that the beginning letters of each line form words when taken consecutively.
Alliteration	The repetition of consonant sounds in words near each other.
Cinquain	Made up of five lines. The first line is one word; the second line contains two words that describe the first line. The third line has three words, and the fourth line has four words. The fifth line has one word that is the same word used in the first line.
Couplet	Stanzas contain two lines that rhyme with each other.
Free verse	Does not follow any structure or style. It is patterned by speech and images rather than by regular metrical schemes.
Haiku	Requires three sentences containing five, seven, and five syllables, respectively. The sentences do not need to rhyme. Traditionally, haiku includes references to nature.
Quatrain	Four lines in a stanza. The second and fourth lines rhyme and have similar syllable structures.
Terza rima	A verse form composed of iambic tercets (three-line groupings). The second line of each tercet sets the rhyme for the following tercet, thus linking the stanzas. The rhyme scheme is "aba bcb cdc..."

sophisticated vocabulary to be accepted (Linaberger 2004). We do not specify a particular format for our poetry assignment—they do not need to follow a fixed meter, rhythm, or pattern. As a result, students turn in poems that range from simple, four-sentence rhymes to complex, multiverse constructions.

A quick conversation with a language arts teacher can easily focus the poem structure on a type of poetry taught in students' English classes. This alignment of expectations and assignments across content areas may increase student participation while providing time to develop high-quality poems. Students can also choose to publish their poetry online or enter it in the annual science poetry contest sponsored by the Science Education Review (see "On the web").

Putting it all together

One of our field-note poetry activities took place off campus, just east of the Cascade Mountains, in a picnic area facing an outcrop that exposes several layers of columnar basalt. This field site borders a small stream to the west and a two-lane state highway to the east. This was the first time our students had been here. They drew T charts in their field notebooks; made sensory observations; and drew sketches of the outcrop. Using their observations, they then wrote their own poems; a sample student poem is shown in Figure 3.

Poetry is the creative expression of thought—and a medium for students to organize their thoughts and impressions. Field-note poetry provides teachers with insight into their students' content knowledge development, while showcasing emergent perceptions and evolving attitudes about scientific concepts and processes. For example, one of our students came to recognize that Earth scientists view the world differently—and value that difference:

> Take a normal person with normal views
> Turn on the mind of a geologist
> And the Earth breathes life…
> Ignorance is not always bliss.

William Cullen Bryant (Wilson 1991; p. 121) said that "poetry is that art which selects and arranges the symbols of thought in such a manner as to excite the imagination the most powerfully and delightfully." The National Science Education Standards encourage students to showcase science in "a variety of ways, such as orally, in writing, and in other forms" (NRC 2000, p. 192). Student poems reveal levels of creativity and depth of understanding that cannot be expressed in traditional science reports or structured science notebooks.

FIGURE 3

Sample student poem.

The Story
I see debris on the outcrops
Columnar joints of basalt like nature's art sculptures
I see the easy flow of a river
Tiny rocks between my feet
Patches of yellow and green grass
Little shrubs struggling for sunshine in the heat waves
Radiating through
I hear the beat of running water
Bugs chirping
Nature at work
I hear my feet cracking underneath
The rocks as I try to figure out the story of what
happened here
I ask myself…
A lava flow, what caused it?
Geothermal heat? An earthquake?
I see the clues of the past in the rocks
In the banks
In nature all around
Then I hear the roar of cars
Breaking my serene silence
My story of the land disappearing
My concentration broken
But not my will to do this job
Not my will to help the world
Nor discover its hidden mystery

FIGURE 4

Field-note poetry rubric.

	3 points	2 points	1 point
Science content knowledge	Excellent understanding and application of science content	Good understanding and application of science content	Poor understanding and application of science content
Sensory images	Vivid, detailed sensory images	Clear use of sensory images	Some use of sensory image
Use of language	Uses rich and imaginative language	Appropriate choice of language	Imprecise or inappropriate choice of words

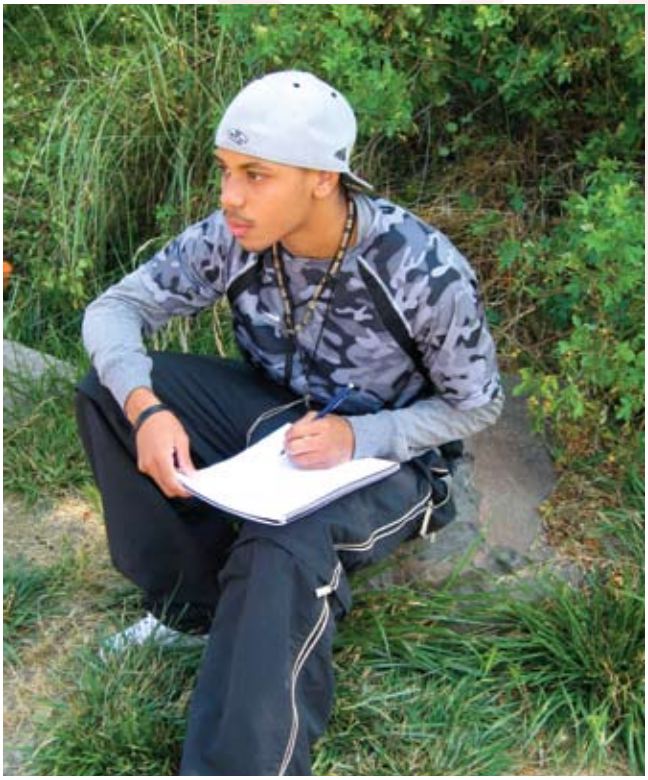
Assessing the activity

Formative assessments are embedded in daily instructional activities, such as field notes, sketches, sensory observations, and answers to open-ended questions. These flexible assignments are used for immediate insight into students' developing ideas and to determine whether learning objectives have been achieved. Poems are interpreted in light of previous formative assessments. For example, the student's ability to distinguish rhyolite from basalt, or identify columnar joints is measured in a lab practical. Students learn to analyze and predict the sequence of events in the rock cycle. Poems are also assessed using a rubric (Figure 4) to gauge three key poem attributes: science content knowledge, sensory images, and the use of language.

A new way to see the world

Poetry is a unique and powerful way of exploring and knowing the world. It is a creative vehicle that students can use to "explore and express…the qualitative dimensions of experience" (Wilhelm 2009), while deepening their understanding. Because poems frequently rely on imagery and word association, they provide students with a creative and imaginative application of observational data. They also reinforce science vocabulary (Cabrera 2008).

Field-note poetry forges interdisciplinary connections by combining knowledge of poetry structures and science content. Supporting activities provide opportunities for students to make observations and qualitatively express developing knowledge through semistructured field notes, sketches, and sensory observations. In combination, these engaging, cross-curricular, instructional techniques facilitate learning and engage students while transforming the classroom experiences of both teachers and students. ■



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On the web

Science Education Review 2010 International Science Poetry Competition: *www.scienceeducationreview.com/poetcomp.html*

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