

SCIENTIFIC JOURNALS: A CREATIVE ASSESSMENT TOOL

A third-grade class publishes “scientific journals” based on findings from science investigations and built from science notebook writing assignments.

By Larissa Beckstead

"In this investigation, I discovered that the ecosystem is more than just a bush. It is a life cycle..." reported one of my students in his article for the class science journal. That issue of *Beckstead Heights' Science Journal* contained articles about the bush outside our classroom. The conclusion the student drew was from three months of observing the bush and recording data in his science notebook. Through a science journal, my students were able to publish their findings like a "real scientist" while practicing writing skills—and I was able to assess their science and literacy learning.

Typical use of science notebooks is for students to record information as they complete an investi-

gation, writing down their procedure, observations, data, results, graphs, and any other factual information pertaining to their experiment. Our class did the same, but I incorporated specific writing assignments to prepare students to publish "articles" about their science investigations in a class science journal. During that school year, we published eight science journals, all based on investigations or special projects the students completed. In this article, I describe how I integrated language arts and science throughout the school year.

Essays

Having my students create science journals doesn't happen during the first week of school. The students



need to have data and other information recorded in their science notebooks in order to be able to create science journals. A good place to start is our rocks and minerals unit. During this unit, students observe different types of rocks, do different tests on the rocks, go on a rock hunt, and make igneous, sedimentary, and metamorphic rock models from food. All observations are recorded in their science notebooks.

But we are still not ready to create the journal. Not only does the science have to be taught, but also certain writing skills and grammar skills have to be taught and developed before having students write articles, stories, or poems for a science journal.

I don't introduce the science journal until a few months into the school year. This is after I have

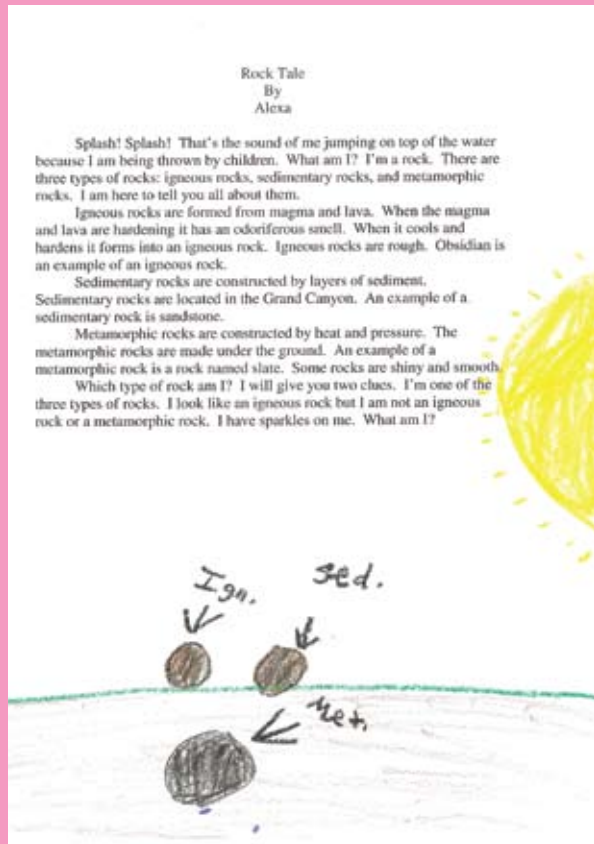
taught the first three essays in the book *10 Easy Writing Lessons That Get Kids Ready for Writing Assessments* by Mary Rose (1999). This book provides a teacher with well-structured lessons that teach students how to write a five-paragraph essay. Narrative, expository, and persuasive writing lessons are outlined in the book.

I also have students develop their vocabulary. I give them a list of words that they may *not* use in their writing, such as *good*, *nice*, *fun*, and *cool*. They must use a dictionary or thesaurus to find synonyms to use instead.

The final piece to the writing puzzle that helps develop students' grammar skills (subordinate clauses, correct use of adverbs and conjunctions, and para-

Figure 1.

Rock essays example.



graph structure) is *Elementary, My Dear! Caught'ya! Grammar With a Giggle for Grades One, Two, and Three* by Jane Bell Kiestler (2003) (She has also developed *Grammar With a Giggle* books for grades 4–12). This is a daily oral language practice that has students adding a sentence each day to the story. All of these tools help students be successful when they begin writing articles for our class science journal.

I am now ready to introduce the first article that students will be writing for our science journal. This article is about the three types of rocks told from a rock's point of view (Figure 1). Its structure is similar to one of the essays from the writing book, which allows students success in their first attempt in scientific writing. In this first science journal writing, I provide students with most of the first paragraph and the last paragraph. They will fill in the blanks with information they want to include in those paragraphs. The second, third, and fourth paragraphs are each about a different type of rock. This is where students will use the information they have recorded in their science notebooks. I tell my students that if they wrote an interesting sentence in their notebook

about igneous rocks, for example, they are allowed to copy that sentence because it is their original work. I also allow students to use different science books that were read during the unit of study to help them with their writing.

Along with providing the structure of this first science journal writing, I give students a rubric of what is to be included in the essay (Figure 2). I also include in the rubric writing strategies I will be grading so students are sure to include those strategies in their writing.

Do I provide this kind of structure for every other science journal article? It really depends on the students. For most of the class, once I have taught a format that can be used when writing an article for our science journals, I only provide some basic structure. I give them the topic of each paragraph, but I don't tell them what should be written in the paragraph. After having written the first essay and using their science notebooks to retrieve information, most students are able to do the process on their own. Some students do require more guidance than just being told the topic of each paragraph. For these students I provided the same kind of help that I did on the first essay. These students receive a more detailed rubric to help guide them during writing of the article. I also provide more one-on-one instruction for these students. This allows all students to be successful in writing each science journal article.

Once students complete the article, I make multiple copies of each article so students have a full copy of our class's science journal to take home to share with their family. Students also read their article aloud to the class, which is enjoyable for everyone.

Letters

I have students write their first letter after we complete the volcano investigation in our unit on the changing Earth. In this investigation, students simulate volcanic eruptions with baking soda and vinegar, but I add a twist. After making clear that our classroom eruption is caused by a chemical reaction and is therefore not an accurate model of a volcano, students use colored modeling clay to cover the areas where the "lava" flowed. Students repeated these steps three more times. Each time they used a different color of clay. Students then use a clear straw to take a core sampling off the side of their volcano to see the different layers of "rock." This investigation shows one way that mountains can be formed.

After having completed a volcano investigation, reading books about layers of the Earth, and designing a model of the layers of the Earth, I have students write a letter to someone as if they are volcanologists

who have been studying the volcano on the island of Hawaii (Figure 3, p. 26). Before letting students write their letters, I do three things. First, we review how to write a personal letter. I write a sample letter on the boards so students have a model of a letter to help them during their letter writing process. Second, I have the class brainstorm words they can use to explain what happens during a volcanic eruption, such as *rumble*, *splash*, *bubble*, or *spill*. I leave the list up for students to use during the letter writing process. Finally, I review the science concepts we covered in the unit. Magma is liquid rock located under Earth's surface. When it erupts out of the volcano it is called *lava*. Lava cools and hardens into igneous rock. Then I tell students that I expect to see those concepts in their letters and again provide a rubric to remind them of these expectations.

Through writing, a teacher can learn many things about a student's understanding of the concepts covered in a unit of study.

After the reviewing and word brainstorming has been done, I have students select to whom they would like to write their letter. Many students like to write to their former teacher. If they do, I make sure to make a copy of the letter for that teacher to have to read.

Again, the science notebook plays an important part in the students' writing. The information they gathered during the volcano investigation helps them write interesting details in the body of their letter. Students also find that the books we read help them provide accurate information about a volcanic eruption.

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Poetry

Because poetry is part of our third-grade language arts standards, I also have students write the following types of poems about nature:

- Haiku
- Tanka
- Cinquain
- Lantern
- Acronym

I have found that Robert Frost's poems provide students with excellent examples of how a poet has written about the world around him. This past school year, I had my class write poems about the bush outside our classroom. As mentioned at the beginning of the article, my class spent three months studying the bush as an ecosystem during our unit of study on ecosystems. Students were able to observe the bush in its dormant

Figure 2.

Rock essay rubric.

Paragraph One:

Four Sentences 5 points _____

Onomatopoeia 5 points _____

Paragraph Two:

Igneous Rock 2 points _____

How is it formed? 5 points _____

Give an example of an igneous rock. 2 points _____

Paragraph Three:

Sedimentary Rock 2 points _____

How is it formed? 5 points _____

Give an example of a sedimentary rock. 2 points _____

Paragraph Four:

Metamorphic Rock 2 points _____

How is it formed? 10 points _____

Give an example of a metamorphic rock. 2 points _____

Paragraph Five:

Two clues about which kind of rock is narrating the essay. 5 points _____

Ends with a question 5 points _____

Sentence Fluency 10 points _____

Word Choice 10 points _____

Organization 10 points _____

Presentation 18 points _____

Total Points 100 points _____

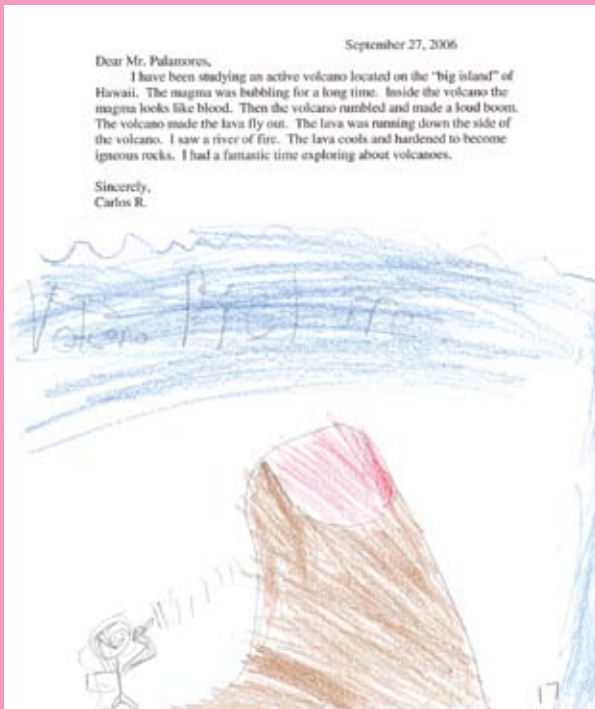
Grade _____

phase in winter and watched it come "back to life" in the spring. The flowers on the bush that grew during springtime later turned into berries, providing food for birds and squirrels. When the flowers started to bloom, bees came to the flowers to collect nectar. This was a wonderful opportunity for urban school children to observe the interactions of an ecosystem as well as see the life cycle of a plant.

Before students wrote their poems about the bush, I had them read a few of Robert Frost's nature poems. When it came time to write their poems, some students did find it easier to write the poems by sitting outside by the bush for inspiration. I believe having students read and write poems helped them do better on the poetry section of the reading assessment at the end of the year.

Figure 3.

Volcano letter sample.



Assessment

Because every writing assignment occurred at the end of a science unit and required inclusion of scientific concepts covered in that unit, our science journals were an excellent form of assessment. Through these types of writing, a teacher can learn many things about a student’s understanding of the concepts covered in a unit of study. By reading a student’s essay, poem, or letter, a teacher can determine if a student needs clarification of any misconceptions they may have. These articles also help a teacher determine if a concept needs to be retaught. An example of this is the following excerpt from two students’ letters:

“I have been studying the active volcano located on the ‘big island’ of Hawaii.’ The lava splashed out of the volcano. The lava splashed in the water.”

When this letter is compared to the following letter it is obvious the student missed the concept that lava hardens and cools into igneous rock.

“I have been studying an active volcano located on the ‘big island’ of Hawaii. The volcano was rumbling. Then I heard a loud BOOM! The lava was all over the place. It looked rusty. When the lava cools and hardens it turns into igneous rocks. I had a fantastic time in Hawaii studying the volcano.”

Spending a few minutes during science reviewing what happens to lava when it cools can help the first

student remember concepts he forgot to include in his letter. This can be done through oral review, having students draw the steps of igneous rock formation, or small-group discussions.

Of course, science journal writing is not limited to only the types of writing mentioned in this article. All of the writing genres can be used in science journals. In whatever format you choose to have your students write, I am sure you will find that this helps improve their writing skills as well as their scientific literacy skills. Improving test scores is not the only reason I incorporated science journals into my curriculum. Having my students develop an interest in science and hearing the excitement in their voices when they say they are being real scientists is reason enough! ■

Larissa Beckstead (issybeck@yahoo.com) was a third-grade teacher at Sunridge Elementary School in Phoenix, Arizona, when these activities were completed.

Resources

Kiester, J. 2003. *Elementary, my dear! caught’ya! Grammar with a giggle for grades one, two, and three.* (2nd ed.) Gainesville, FL: Maupin House Publishing.
 Rose, M. 1999. *Ten easy writing lessons that get kids ready for writing assessments: Proven ways to raise your students’ scores on the state performance assessments in writing.* New York: Scholastic.

Internet Resource

Science Notebooks in the K–12 Classroom
www.sciencenotebooks.org

Connecting to the Standards

This article relates to the following *National Science Education Standards* (NRC 1996).

Content Standards

Grades K–4

Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

Standard C: Life Science

- The characteristics of organisms
- Life cycles of organisms
- Organisms and environments

Standard D: Earth and Space Science

- Properties of Earth materials

National Research Council (NRC). 1996. *National science education standards.* Washington, DC: National Academy Press.