Linking Science and Literacy

ABSTRACT We successfully integrated science and language arts in a third-grade classroom. The students used “scientist’s eyes” and “poet’s eyes” to write original poetry. In addition, they created habitat posters about a swamp organism. Scoring guides for the habitat poems and posters are also included.

KEYWORDS literacy links, multidisciplinary, poetry, research, swamp organisms

INTRODUCTION AND BACKGROUND

The Importance of Integrating Science and Language Arts

Students’ experiences help them construct meaning from the facts, concepts, and ideas shared in children’s literature. Narrative text can enhance students’ construction of scientific concepts. “Science is also an ever-changing narrative as more facts and information emerge as a result of inquiry. Science as a narrative enables the children to explain and interpret their experiences and clarify their own ideas within an authentic and familiar language form” (Scott 1993, 43).

In addition, writing enhances the learning of science concepts. “Whether supporting content learning, guiding teacher instruction, or furthering the development of students’ literacy or science process skills—or all of the above—nonfiction writing opportunities are an essential aspect of science learning from which teachers and students benefit in many ways” (Akerson and Young 2005, 41).

Poetry and Science

Robin Freedman (1999, 112) suggests, “Poems become conceptual pictures of different scientific concepts.” Within Lucy Calkins’s lessons, she utilizes the strategy of “looking through a poet’s eyes” to help students understand that poetry is more figurative language. For example, instead of saying, “The ceiling is at the top of our classroom,” Calkins would teach students to say, “The ceiling is the sky of our classroom” (Calkins and Parsons 2003). When teaching this lesson we referred back to previous poetry lessons from earlier in the school year. We as a third-grade class differentiated between a “scientist’s eyes” and a “poet’s eyes” when describing a habitat. By doing this, students were able to describe and illustrate a habitat using a scientist’s eyes or a literal description of the habitat and organism. In the following lesson, the book Toad by the Road (Ryder 2007) helped illustrate how we can also look at a habitat through a poet’s eyes. Students then created original poems describing the selected habitat from the previous lesson. Using the two strategies, students were able to more effectively...
internalize the scientific information by using two different ways of thinking about the same science content information.

**MATERIALS**

- *Deep in the Swamp* (Bateman 2003)
- *Toad by the Road: A Year in the Life of These Amazing Amphibians* (Ryder 2007)
- Additional grade-level appropriate books on aquatic habitats and organisms
- Paper (both unlined 9 × 12 manila and lined writing), 1 to 2 pieces per student
- Writing tools
- Drawing and coloring tools (crayons, colored pencils, markers)

**PROCEDURE**

**Implementation of the Lessons**

**Lesson 1**

1. Expose students to the characteristics of a swamp habitat. Dona Bateman’s book *Deep in the Swamp*, set in the Okefenokee Swamp, reveals animals of the southern U.S. swamplands that swim, jump, fly, climb, scuttle, and snooze through striking illustrations and poetic rhyme (see Figure 1). In addition, explanations of “neverwet” plants, rat snakes, and other swamp life provide facts about the lives of those swamp creatures. Although students may not have prior experience with some of the represented organisms, their experiences do permit them to relate to such organisms as alligators, frogs, and snakes. For example, the page on the flame bird (or prothonotary warblers) includes the poetic lines,

   Deep in the swamp, in a hollow cypress knee,
   Lived a mother flame bird and her little chicks Three.  
   (Bateman 2003, 6)

2. The teacher asks questions such as, “What do all animals need to survive?” Student responses show their understanding of the idea that animals need air, water, and food to survive in an environment in which their needs can be met.

3. Students make precise choices for their habitats and discuss the choices made with peers (see Figure 2).

4. Students apply their knowledge of an organism’s needs by creating a habitat for a specific organism from the swamp habitat. An interesting and frequent student misconception during this lesson was that crocodiles are common in American swamps. Although the American crocodile is found in southern Florida, in general, *alligators* are found in U.S. swamps.

5. Next, students use individually appropriate books (see Appendix for a list of suggestions) on aquatic habitats and organisms to research information about habitats and their organisms.

6. Student habitats include other species that could survive in this habitat as well.

7. Finally, they draw their habitats in a poster format on a 9 × 12 sheet of manila paper (see Figure 3).
Lesson 2

1. This class begins with the teacher’s question, “What do you need to survive in your habitat?”
2. Children write their responses on a small sticky note.
3. Following their individual responses, the class as a whole discusses the idea of a home or shelter, water, and food as necessities for organisms.
4. The teacher’s question, “Could a polar bear survive in our habitat here in Kentucky?” promotes a discussion of how the needs of animals must be met for them to survive.
5. Due to the small size of the class, students discuss the idea of habitat and specific organisms as a whole class. In a larger class, small groups could first discuss habitats and specific organisms prior to a whole class discussion.
6. The book Toad by the Road: A Year in the Life of These Amazing Amphibians gives examples of how students can look through a poet’s eyes at science content. These seasonal poems delighted our young readers.
7. Looking at the language and the layout of the poems in the book provides expectations for the poems created by students. For example, the poem “Tadpole’s Surprises” shares the wonder of a tadpole gaining legs in the lines,

I’m sleek and shiny,
Smooth and black.
Hey, legs are popping
Out in back.
(Ryder 2007, 12)
8. Additional poems share the breeding chorus, tadpoles, and behaviors and traits as well as habitat information. The poems “Toad in the Garden,” “Toad by the Road,” and “Old Toad’s Warning” are read and discussed with the children.

9. Instruct students to write an original poem through a poet’s eyes about the same swamp organism selected in the prior lesson.

10. Children describe the habitat in a poem, including how needs are met (see Figures 4 and 5).

11. Students also create illustrations (see Figures 4 and 5) to demonstrate a visual reinforcement for the text of their poetry.

DISCUSSION AND FINDINGS

Students were highly engaged during this series of lessons. They listened attentively to *Deep in the Swamp* as they learned about unfamiliar as well as familiar swamp organisms. The poetry examples from *Toad by the Road* provided appealing models for their original poems. In Figure 3 a student’s flame bird habitat poster demonstrates knowledge of the habitat and natural history of the bird. Students’ posters displayed knowledge of facts as well as more creative talents. The illustrated poems included in Figures 4 and 5 also provide evidence of students’ knowledge and understanding of organisms and their needs.

ASSESSMENT AND EXTENSIONS

Scoring guides (see Tables 1 and 2) were created using Rubistar to evaluate students’ posters and poetry. An accommodation and extension are also provided below.

Assessment

Scoring guides created with RubiStar (http://rubistar.4teachers.org).

<table>
<thead>
<tr>
<th>TABLE 1 Habitat Poster Scoring Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category</strong></td>
</tr>
<tr>
<td>Graphics—Relevance</td>
</tr>
<tr>
<td>Grammar</td>
</tr>
<tr>
<td>Content—Accuracy</td>
</tr>
<tr>
<td>Attractiveness</td>
</tr>
<tr>
<td>Knowledge gained</td>
</tr>
</tbody>
</table>
TABLE 2 Habitat Poem Scoring Guide

<table>
<thead>
<tr>
<th>Category</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creativity</td>
<td>The poem contains many creative details and/or descriptions that contribute to the reader’s enjoyment. The author demonstrates imagination.</td>
<td>The poem contains a few creative details and/or descriptions that contribute to the reader’s enjoyment. The author demonstrates imagination.</td>
<td>The poem contains a few creative details and/or descriptions, but they distract from the story. The author has attempted to demonstrate imagination.</td>
<td>There is little evidence of creativity in the poem. The author does not demonstrate imagination.</td>
</tr>
<tr>
<td>Focus on assigned topic</td>
<td>The entire poem is related to habitats topic and allows the reader to learn from the poem about the topic.</td>
<td>Most of the poem is related to habitats. The poem wanders off at one point, but the reader can still learn from the poem about the topic.</td>
<td>Some of the poem is related to habitats, but a reader does not learn much about the topic.</td>
<td>No attempt has been made to relate the poem to habitats.</td>
</tr>
<tr>
<td>Accuracy of facts</td>
<td>All facts presented in the poem are accurate.</td>
<td>Almost all facts presented in the poem are accurate.</td>
<td>Most facts presented in the poem are accurate.</td>
<td>Several factual errors are included in the poem. Illustrations are not present, or they are not original.</td>
</tr>
<tr>
<td>Illustrations</td>
<td>Original illustrations are detailed, attractive, creative, and relate to the text on the page.</td>
<td>Original illustrations are somewhat detailed, attractive, and relate to the text on the page.</td>
<td>Original illustrations relate to the text on the page.</td>
<td>Illustrations are not present, or they are not original.</td>
</tr>
</tbody>
</table>

Accommodation

As an alternative to the written tasks, students might communicate habitat information with a partner by creating a bridge. First, the two students stand and face each other with palms out and touching to create a bridge (like in the game London Bridge). Using eye contact, students describe to a partner how the needs of living beings are met in the swamp habitat.

Extension

An extension activity involves students in an application of the concepts learned.

1. Choose an animal living in the pond or swamp.
2. Imagine that you are a zookeeper.
3. You need to capture the animal for your zoo.
4. Illustrate and/or describe what you need to create a habitat that will allow this species to survive.
5. Explain why you made those choices.

CONCLUSION

This science and literacy experience provides an effective method for motivating students while they learn more about organisms that live in swamps. Throughout the lesson sequence, the children were highly engaged, frequently sharing with their table mates what they learned. Students eagerly created and shared their original poetry and habitat posters. As teachers struggle with the increasing external demands on the school curriculum, the integration of language arts with science can enhance both subject areas. This series of lessons linking science and literacy successfully engaged children in a rich learning experience.

TEACHER RESOURCES

http://rubistar.4teachers.org
List of potential habitat books for student research (see Appendix)

CONNECTING TO THE STANDARDS

This article relates to the following National Science Education Standards (National Research Council 1996):

Content Standards K-4
Standard C Life Science: Organisms and environments
Standard F Science in Personal and Social Perspectives:
Types of resources
Changes in environments

Linking Science and Literacy

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REFERENCES


APPENDIX: LIST OF POTENTIAL HABITAT BOOKS FOR STUDENT RESEARCH
