Linking Science and Literature for ESL Students

by Nancy L. Hadaway, Sylvia M. Vardell, and Terrell A. Young

The gap between ESL students' language facility in everyday settings and their verbal skills in content areas such as science poses a big problem. In addition to encountering subjects with which they have no prior knowledge or experiences, ESL students find the structure of textbooks confusing and the level of new vocabulary—especially technical terminology—almost paralyzing. Teachers need supplemental materials that extend concepts, offer additional explanation, and utilize simpler vocabulary.

Children’s literature supplies a powerful alternative. Trade books provide current information on a multitude of topics, in varied and innovative formats, using appealing illustrations and language. In short, they provide excellent support for science instruction. In particular, literature holds great promise for supporting students with diverse language proficiencies and reading levels, assisting them in actively participating in class. We maintain that a combination of genres including nonfiction, fiction, and poetry can serve to ground science instruction in the latest information available on a topic while keeping motivation high.

Choosing and Using Nonfiction Literature

There are many kinds of nonfiction books that can supplement the science curriculum. Concept books and survey books present basic information about a single topic simply, in an interesting manner with wonderful visuals that help students learn English terms for concepts they may be familiar with in their native languages. Author Gail Gibbons offers nonfiction titles with colorful cartoon-style illustrations, helpful captions, and exposition on nearly 200 different subjects. Photo-essays by a variety of authors document and validate the text with photographs on nearly every page. Whatever their language proficiency level, students can simply browse through the many splendid photos, or they can read only captions, or give more attention to the main text. English-language learners, in particular, need permission not to read the entire page, not realizing that skimming and scanning are appropriate and necessary. Life cycle books such as Lois Ehlert’s Waiting for Wings (Harcourt, 2001) present the life of an animal in more detail and with more appeal than is usually found in textbooks. Craft, experiment, and how-to books invite readers to engage in activities beyond reading. The hands-on approach of these books, like Seymour Simon and Nicole Fauteux’s Let’s Try It Out in the Water: Hands-On Early-Learning Science Activities (Simon & Schuster, 2001), directly involves new English-language learners. Journals and diaries provide the basis for either the content or the organizational structure of many recent information books, such as Jennifer Owings Dewey’s Antarctic Journal: Four Months at the Bottom of the World (HarperCollins, 2001), and these books also supply an excellent framework for writing activities.

A Multigenre Approach

Finally, teachers should not avoid fiction or poetry in the science classroom. Throughout the process of science instruction, fiction is an excellent resource to follow up on the lesson and further develop language and content connections. Poetry can set the stage for a science lesson and provide a brief but powerful anticipatory setting for the introduction of new science concepts. In choosing fiction or folklore titles with a science connection, such as Jean Craighead George’s story collection Incredible Animal Adventures (HarperCollins, 1994) or the creation myth The Story of the Milky Way by Joseph Bruchac (Dial, 1995), we can provide a story “hook” that adds a personal dimension to the study of science and a complement or contrast to nonfiction selections. Poetry also offers rich language and visual images that can assist with understanding vocabulary terms. For instance, J. Patrick Lewis offers the poem “How Many Humps” in Doodle Dandies: Poems That Take Shape (Simon & Schuster/Atheneum, 1998), which teaches readers to distinguish the two types of camels by taking the first letters of their names and turning them on their sides to remember which camel has one hump (Dromedary) or two (Bactrian). Finally, poetry’s brevity and short lines appear manageable to the reluctant or struggling reader.
Using Topics and Themes

Using a topic or theme to connect language learning and content, we can maximize the opportunity for transfer of knowledge from one lesson to another. Literature is easily interwoven into this thematic approach. Based on teacher input and an examination of national science standards, we chose four frequently cited themes to develop through the multigenre approach: wild animals, space, earth, and weather. The topics or themes used depend on several variables, including the teacher's interest and expertise, the books and resources available on a given topic, and the fit of the topic to the curricular objectives, as well as to state and national standards. The school librarian can be an invaluable resource for gathering a set of books on a particular topic for classroom use. Many librarians are even willing to pull minicollections in advance or order books based on teacher requests and frequently taught units. Whatever the focus, topical or thematic presentation of science concepts and vocabulary for English-language learners offers students an immediate network of relationships that links new words and concepts, as well as a meaningful and motivating context for learning.

Bibliography

Wild Animals

Bateman, Robert, and Rick Archbold. Safari. Illus. by Robert Bateman. 1998. 32p. Little, Brown, $17.95 (0-316-08265-1). Gr. 1-up. This excellent overview provides two layers of text about animals that might be encountered on safari. Bateman provides a page or two of description of each animal and then summarizes this in a boxed inset with a bulleted list of key facts. This multilevel text provides a manageable initial reading for beginning ESL students and a later review. Compare this with the real-life African treks taken by Ted and Betsy Lewin in Elephant Quest (HarperCollins, 2000) or Gorilla Walk (HarperCollins, 1999).

Bruchac, Joseph. The Great Ball Game: A Muskogee Story. Illus. by Susan L. Roth. 1994. 32p. Dial, $15.99 (0-8037-1539-0). Gr. 1-up. This Muskogee folktale puts the mammals against the birds in a ball game that's the ultimate test of superiority, with the poor bat not wanted by either team. In the end, his help carries the day and helps explain several natural phenomena, in this pourquoi tale. Connect this with Douglas Florian's poetry collections on birds, On the Wing (Harcourt, 1996), and animals, Mammalabilia (Harcourt, 2000), or consult Jack Prelutsky's anthology of animal poems, The Beauty of the Beast (Knopf, 1997). For true animal stories, see The Tarantula in My Purse: And 172 Other Wild Pets by favorite animal story author Jean Craighead George (HarperCollins, 1996).

DuQuette, Keith. They Call Me Woolly: What Animal Names Can Tell Us. 2002. 32p. Putnam, $15.99 (0-399-23445-4). Gr. 1-up. What's in a name? In the case of the polar bear, white shark, or rat snake, the name provides helpful descriptive information. Using simple language, DuQuette highlights these name clues and key words and gives thumbnail sketches containing more elaborate text. This is a wonderful vocabulary builder that almost seems designed for ESL students.

Fraser, Mary Ann. How Animal Babies Stay Safe. 2001. 32p. HarperCollins, $15.95 (0-06-028803-5); HarperTrophy, paper, $4.95 (0-06-445211-5). Gr. 1-8. Animal babies are small and helpless and must survive in sometimes hostile and dangerous circumstances. With directness and simplicity, Fraser highlights how animal parents keep their babies safe. At the end of the book, the author poses a series of questions that helps readers draw parallels between how humans and animals safeguard their young. Link this title with the poetic picture books S are, Warm, and Snug by Stephen Swinburne (Harcourt, 1999) and Leaving Home, about when and how animals leave home, by Sneed B. Collard III (Houghton, 2002).

Hickman, Pamela. Animals Eating: How Animals Chomp, Chew, Slurp, and Swallow. Illus. by Pat Stephens. 2001. 40p. Kids Can, $10.95 (1-55074-577-8); paper, $5.95 (1-55074-579-4). Gr. 1-up. Since we all eat and drink, this topic is a familiar and interesting one for children. Plus, this book offers wonderfully vivid illustrations to capture students' attention. Hickman covers a host of topics, from the food web to different types of teeth to the diverse diets of animals. A hands-on experiment for each topic offers an opportunity to reinforce both content and language. See also Slap, Squeak, and Scatter: How Animals Communicate by Steve Jenkins (Houghton, 2001) for a concise overview of animal communication.

Jenkins, Steve, and Robin Page. Animals in Flight. 2001. 32p. Houghton, $16 (0-618-12351-2). Gr. 1-up. Jenkins and Page combine two high-interest topics in a format that works at several levels due to the increasing complexity of the text. While grounded by a direct and engaging line of exposition easily understandable to beginning ESL readers, inset illustrations on each page offer elaboration with fascinating facts about the dragonfly, honeybee, hawk, etc. Finally, the authors present thumbnail sketches of earlier illustrations and a paragraph of supplementary information related to each animal. This layering of information and language is well-suited for ESL readers of all ages.

Space

Goble, Paul. Her Seven Brothers. 1988. 32p. Aladdin, paper, $6.99 (0-689-71730-X). Gr. 1-up. In this beautifully illustrated folktale, a young Cheyenne girl skilled in sewing prepares beautiful clothes for brothers she hasn't met. When they are united, they must flee together from a common enemy, thus becoming the stars of the Big Dipper. As an extension, look for Space Songs by Myra Cohn Livingston (Holiday, 1988), which features 13 poems about the mysteries of space, from comets to constellations. See Zoo in the Sky by Jacqueline Mitton (National Geographic, 1998) for a factual introduction to the animal constellations.

Leedy, Loreen. Postcards from Pluto: A Tour of the Solar System. 1993. 32p. Holiday, $16.95 (0-8234-1000-5); paper, $6.95 (0-8234-1237-7). Gr. 1-up. In a combination of narrative and expository styles, this picture book both provides a foundation of information about the solar system and recounts the imaginary adventures of a group of kids on an excursion to the various planets. At each planet, one of the children sends home a postcard with facts about that planet. The postcard format with its limited text is appealing and can be used as a model for a writing project with ESL students. The graphics and labels help ESL students with vocabulary development. Combine this with the dramatic photographs found in Eye Wonder: Space by Simon Holland (DK, 2001) for additional richness.

Mitton, Jacqueline. Kingdom of the Sun: A Book of the Planets. Illus. by Christina Baitl. 2001. 32p. National Geographic, $16.95 (0-7922-7220-X). Gr. 1-8. Two-page overviews on each planet, containing simple, first-person text, provide a good introduction to the solar system. An excellent chart with various statistics about the planets is offered at the end, as well as a brief glossary. For simplicity and directness in writing, see the new edition
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specific weather phenomenon, check out weather, students can browse through highlighting the pattern of the sun's rays or the wind on different points of the earth provide additional support. For more general facts about Gr. 1-up. Vivid photographs of clouds, ice crystals, etc. complement the straightforward exposition of weather facts. Graphics such as the ones Simon, Seymour. 

Weather Forecasting closely match the text. This book is rich with vocabulary potential; for instance, moisture is illustrated as rain, drizzle, hail, and snow. See also Gr. 1-up. Gibbons provides a basic overview of weather by defining temperature, air pressure, moisture, wind, and related terms. Labeled drawings Gibbons, Gail. particularly helpful to ESL students. For information about the seasons combined with stunning photographs, see also Seymour Simon's books: She then describes each season and activities associated with it. The graphic illustrations, clear labeling, and step-by-step progression are Gr. 1-up. Using a series of graphics describing the earth's tilt and rotation in relation to the sun, Gibbons demonstrates what causes the seasons. For another excellent overview of the desert, check out Death Valley: A Day in the Desert by Nancy Smiler Levinson (Holiday, 2001), whose clearly labeled illustrations aid vocabulary development, or Cactus Poems by Frank Asch (Harcourt, 1998), a wonderful collection of poetry featuring desert animals and plants.


Gr. 3-up. This story offers an abundance of detail about forests in recounting the one-day adventure of a young girl in search of a rare glimpse of an ovenbird. Along the way, she also sees deer, skunks, ducks, and flying squirrels. The story context provides a frame for learning about nature, and the "one day" format helps readers grasp the rhythm of forest life. Ecosystems addressed in other "one day" titles by George include the desert, the rain forest, the prairie, and the tundra. For poetry about nature, see Barbara Brenner's anthology The Earth Is Painted Green (Scholastic, 2000) or Jane Yolen's poem picture book Welcome to the River of Grass (Putnam, 2001).


Gr. 1-up. Gibbons offers an excellent overview of the tropical rain forest through clear text and a variety of graphics. Several maps place rain forests in geographical perspective. New vocabulary is highlighted in italics and, on the opposite page, illustrations are labeled with these terms, which is helpful for ESL students. For another narrative portrait of the rain forest, see The Great Kapok Tree: A Tale of the Amazon Rain Forest by Lynne Cherry (Harcourt, 1990).


Gr. 2-up. Beginning with the endpoints, this book highlights life forms from the desert, offering a fascinating glimpse of the tremendous variety. Endnotes offer additional information about the illustrations and options for further research, as well as a world map that highlights all the deserts. For another excellent overview of the desert, check out Death Valley: A Day in the Desert by Nancy Smiler Levinson (Holiday, 2001), whose clearly labeled illustrations aid vocabulary development, or Cactus Poems by Frank Asch (Harcourt, 1998), a wonderful collection of poetry featuring desert animals and plants.


Gr. 2-up. In spare language, Locker creates a poetic portrait of mountains by linking his dramatic illustrations with descriptions of mountain types and how they are formed. Another poem picture book that highlights mountains is Sierra by Diane Siebert (Harcollers, 1991). Learn about the mysterious world deep inside mountains in Diane Sieberr's poetic Cave (Harcollers, 2000), or in Caves: Mysteries beneath Our Feet by David L. Harrison (Boysd Mills, 2001).
ALA has configured the CKEditor toolbar in our Drupal installation with a set of features that support usability and accessibility best practices and will reinforce (not over-ride) the Cascading Style Sheets (CSS) that assign a pre-defined look (color, font family, font size, font weight, text decoration, etc.) to each of the distinctly themed areas of ALA.org. Remember to adhere to the Nine Guidelines for Maintaining High Quality Webpages when formatting Webpage text. To learn how to master each feature on the toolbar, follow